

Arizona Willow

(Salix arizonica)

Conservation Agreement and Strategy



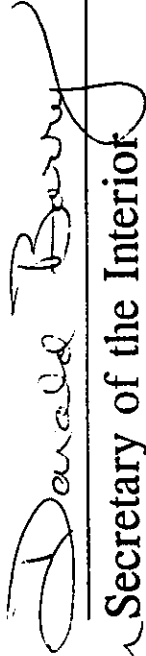
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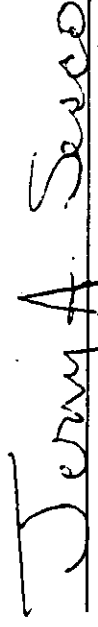
April 1995

Declaration of Support for the Conservation of Arizona Willow

May 19, 1995

We acknowledge and support the cooperative efforts of the U.S. Fish and Wildlife Service, U.S. Forest Service, National Park Service, and participating cooperators (Arizona Game and Fish Department, Utah Division of Wildlife Resources, and White Mountain Apache Tribe) that led to development and implementation of the Arizona Willow Conservation Agreement and Strategy. This agreement fully meets the intent of the National Interagency Memorandum of Understanding (94-SMU-058) to conserve species within their natural ecosystems so that protection under the Endangered Species Act is not warranted.


for Secretary of the Interior


Chief, U.S. Forest Service

DOCUMENT ORGANIZATION

The **Arizona Willow Conservation Agreement and Strategy** document is organized into several component parts. Part I, the **Conservation Agreement**, includes administrative responsibilities and procedures, a summary of short and long-term actions to be implemented for the conservation of Arizona willow, and commitments of the agencies through line officer authorities. Part II, the **Conservation Assessment**, provides a detailed account of the species' biology, ecology, distribution, and evaluation of threats. Part III, the **Conservation Strategy**, provides a discussion of the overall conservation objectives and implementation procedures. Part IV, **Conservation Strategies by Management Agency**, includes a detailed review of the conservation strategies developed by management agencies, and a population by population account of current habitat conditions, population status, and conservation actions. Within the **Appendices** are various support documents.

Literature Citation:

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Cover illustration by Kaye H. Thorne, Brigham Young University, Provo, Utah.

**The Arizona Willow
Conservation Agreement
and Strategy**

is

Dedicated to the Memory of

Gary L. Davis

and

David W. Payne

As wildlife biologists on the Apache-Sitgreaves National Forest, Gary and Dave were hands-on field biologists who worked tirelessly for the conservation of Arizona's wildlife and natural resources. Gary and Dave were avid outdoorsmen, sportsmen, and big game hunters. They always related their work back to what was happening on-the-ground. Land managers and conservationists can aspire to nothing greater.

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PART I

**ARIZONA WILLOW
CONSERVATION AGREEMENT**

ARIZONA WILLOW CONSERVATION AGREEMENT

I. INTRODUCTION

Arizona willow (*Salix arizonica* Dorn) is a small, often distinctive shrub willow that occurs within high elevation riparian ecosystems of the Southwest. A proposal to list Arizona willow under the Endangered Species Act (ESA) as endangered with critical habitat was published in the Federal Register notice of November 20, 1992 (57 FR 54747) (Appendix E). At that time the species was known only from high elevation streams and wet meadows in the Mount Baldy vicinity of Apache County, Arizona, located primarily on the Apache-Sitgreaves National Forests and Fort Apache Indian Reservation. The high elevation riparian ecosystems upon which Arizona willow depends are fragile and additionally support habitat for other rare species of plants and animals (Appendix F). These habitats have been subjected to numerous uses during the past century, and in many cases have been degraded. Threats identified in the proposed rule include livestock and wildlife impacts, water impoundments and diversions, roads, recreational use, development and maintenance of ski resort facilities, disease, alteration of natural hydrologic regimes, and changes in the riparian community species composition and structure, including invasion of nonnative vegetation (especially Kentucky bluegrass), brought about by historic and current livestock use.

In June of 1993, the U.S. Fish and Wildlife Service (FWS) was notified of a previously misidentified herbarium specimen of Arizona willow collected in 1913 from the then named "Sevier Forest" in southern Utah (Franklin pers. comm. 1993). Preliminary surveys in Utah during the summer of 1993 by FWS (England pers. comm. 1994) did not locate Arizona willow. Surveys initiated by the USDA Forest Service (FS) resulted in "rediscovery" of Arizona willow in Utah on June 30, 1994. Subsequent FS surveys documented Arizona willow on the Dixie and Fishlake National Forests, Cedar Breaks National Monument, and adjacent private land (Figure 1). The extent of some individual populations and the stature of Arizona willow plants in Utah far exceeded all populations in Arizona (Palmer pers. comm. 1994).

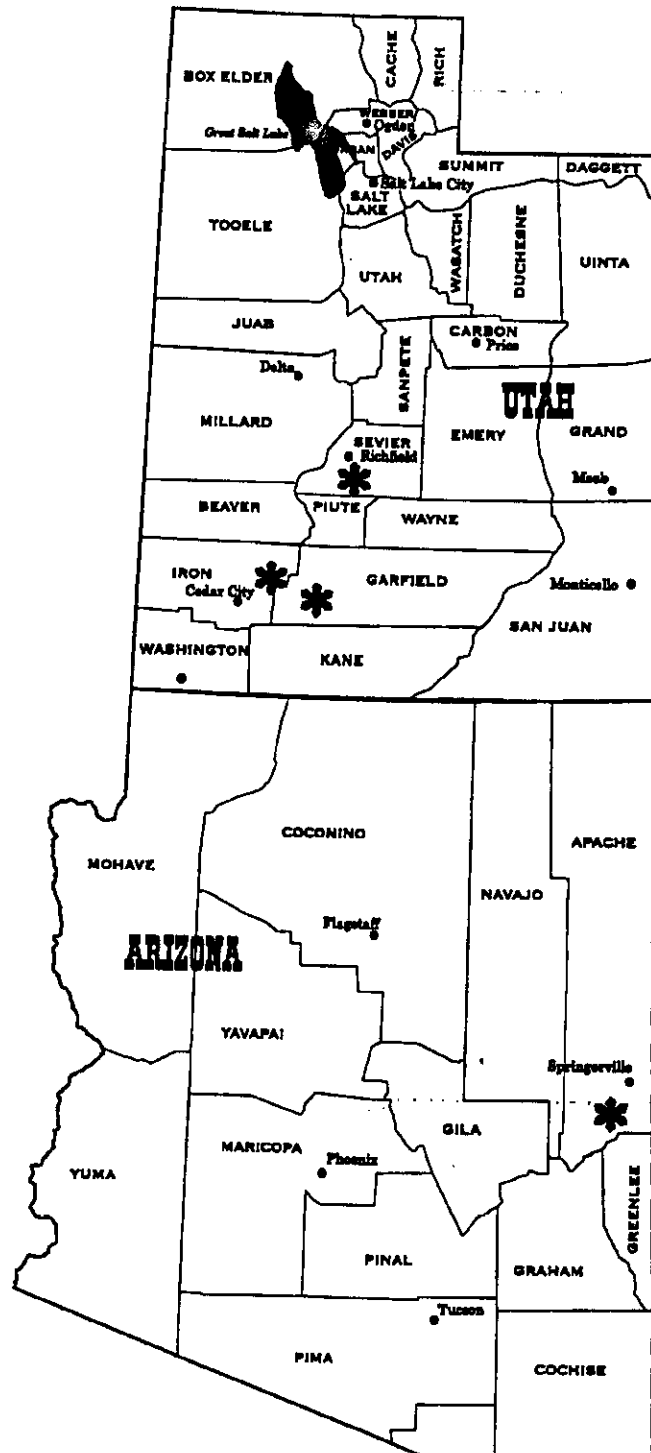


Figure 1. The known distribution of Arizona willow (*Salix arizonica*).

On May 31, 1994, the Southwest Center for Biological Diversity filed a Summons and Complaint based on the FWS failure to meet statutory deadlines to take final action on the proposed rule to list Arizona willow. The FWS, in negotiation with the plaintiffs, reached an agreement to take final action on the proposed rule (Federal Register publication of the final rule or a rule withdrawal) by April 30, 1995.

The discovery of significant Arizona willow populations in Utah presented new biological information which required a re-assessment of the range-wide threats to the species, and also provided an opportunity to pursue new management options. On September 6, 1994, the Regional Foresters of the Southwestern and Intermountain Regions of the FS, and the Regional Director of the FWS Southwest Region, made a joint decision to develop a conservation agreement for Arizona willow on federal lands to ensure the long-term conservation of the species throughout its range within its natural ecosystem. This will be accomplished through the implementation of actions to immediately reduce site-specific threats, provide long-term commitments to protect and improve habitats, and carry out proactive conservation actions. A FS policy statement (Part IV, A), jointly issued by the Regional Foresters of the Southwestern and Intermountain Regions on December 19, 1994, initiated many of these actions on the National Forests (NF), including designation of FS representation on the Arizona Willow Interagency Technical Team. The Arizona Willow Interagency Technical Team was formed to develop and implement the Arizona Willow Conservation Agreement and Strategy.

Concurrent with the development of a conservation strategy for Arizona willow on federal lands, the White Mountain Apache Tribe (Tribe) has developed the "Arizona Willow Management Plan: An Interim Approach to High-Elevation Riparian and Cienega Ecosystem Management on the Fort Apache Indian Reservation." The Tribe manages Arizona willow habitat on the Reservation within the Black and White Rivers watersheds of Mount Baldy. The management and conservation strategies in the Tribal management plan for habitats which include Arizona willow, are consistent with, and complementary to, the strategies and intent set forth in the Arizona Willow Conservation Agreement and Strategy.

II. PURPOSE

The purpose of this Conservation Agreement is to attain the goal of long-term conservation of Arizona willow throughout its range through proactive management of the willow and its ecosystems. The conservation of Arizona willow will require removal of threats, improving degraded habitat conditions, maintaining and/or expanding populations, and restoring many of the natural functions of associated riparian systems. These habitat protection efforts will also benefit many other threatened, endangered, and sensitive plants and animals which share these ecosystems (Appendix F). Ensuring Arizona willow population viability and stability throughout its range may require several decades of intensive efforts. A variety of research projects and studies on the population biology and ecology of Arizona willow will need to be undertaken to fully understand the implications of land management actions. Such studies will help determine appropriate management practices and identify potential areas for expanding and augmenting depauperate populations.

This agreement, and the following conservation assessment and strategy, identifies specific actions that are necessary to reduce threats and provide for the long-term conservation of Arizona willow, and so, listing under the ESA by FWS would not be warranted. The short-term actions are to stabilize populations of Arizona willow by reducing immediate threats that inhibit growth, reproduction, and seedling establishment, and contribute to mortality. The accomplishment of many long-term actions will require further National Environmental Policy Act (NEPA) analysis prior to full implementation.

III. CONSERVATION STANDARDS AND CRITERIA

The conservation of Arizona willow will require preservation of abiotic, biotic, and genetic diversity at population, community, and ecosystem levels. To achieve these objectives and to effectively direct management actions, eight watershed-based "conservation units" are designated as the recovery analysis areas. The following "Conservation Standards and Criteria" define those essential components needed to understand the species' biology, viability, restoration, and management needs, as well as those specific administrative elements necessary to ensure long-

term management continuity and commitment. These will be used, in part, to measure whether the conservation objectives have been accomplished.

A. Scientific data indicate that each conservation unit sustains populations that are viable or that are on a significant upward trend towards viability that is maintained for at least ten years.

1. Collect and analyze biological and ecological data throughout Arizona willow's natural range to determine reproductive biology, genetic makeup, habitat requirements, ecological relationships, and responses to competition, disease, and predation.
2. Conduct surveys and inventories to determine the overall distribution and staaatus of Arizona willow, define potential habitat, and quantify density and abundance.
3. Provide survey data and results of research activities in a timely manner to all interested parties through the Arizona Game and Fish Department (AGFD) and Utah Division of Wildlife Resources (UDWR) Heritage Program databases as the central repository of site-specific information. Tribal information will be managed by the Tribe pursuant to the "Statement of the Relationship between the White Mountain Apache Tribe and the U.S. Fish and Wildlife Service" (December 6, 1994).

B. Unfragmented and high-quality habitat sufficient to ensure long-term survival and recovery is protected within each conservation unit.

1. Enforce existing laws and regulations for the protection of Arizona willow populations.
2. Identify and implement actions required to reduce existing and potential threats from known populations of Arizona willow.

3. Ensure that viable populations and genetic diversity are maintained throughout the species' range.
4. Retain federal lands containing Arizona willow in federal ownership. Acquisition of significant habitats in private ownership with Arizona willow should be pursued when feasible.
5. Designate special management areas such as Botanical Areas, Research Natural Areas, and essential habitat, where appropriate, for the protection and conservation of Arizona willow within each conservation unit.
6. Implement, through administrative procedures, the Arizona Willow Conservation Agreement and Strategy and incorporate provisions of this strategy into agency planning documents and budgets to ensure consistent implementation.
7. Provide mechanisms to oversee implementation of the Arizona Willow Conservation Agreement and Strategy and to evaluate the success of these conservation actions through the Arizona Willow Interagency Technical Team.
8. Increase public awareness, appreciation, and support for the conservation of Arizona willow.

III. AUTHORITY

A. Involved Parties:

1. U.S. Department of Agriculture, Forest Service (FS)
2. U.S. Department of The Interior, National Park Service (NPS)
3. U.S. Department of The Interior, Fish and Wildlife Service (FWS)

B. Authorities:

Endangered Species Act of 1973, as amended, Section 2, establishes the Act's purpose to, "...provide a means whereby the ecosystems upon which endangered and threatened species depend may be conserved..." Section 5 directs the Secretaries of The Department of Agriculture and Department of The Interior to "...establish and implement a program to conserve fish, wildlife, and plants..."

National Forest Management Act (1976) directs Forests to maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitat distributed throughout their geographic range on National Forest System lands.

U.S. Forest Service Manual (FSM 2670) on endangered, threatened, and sensitive species directs the agency to "Develop and implement management practices to ensure that [sensitive] species do not become threatened or endangered because of FS actions."

The national interagency Memorandum of Understanding for the conservation of species tending towards federal listing issued on January 25, 1994 (94-SMU-058) provides the general framework for cooperation and participation among cooperators in the conservation of species.

IV. STATEMENT OF MUTUAL BENEFIT

It is mutually beneficial for the parties involved to secure populations of Arizona willow from habitat loss and degradation. Participating agencies and Arizona willow will benefit from implementing conservation measures that provide the widest possible improvement in the abundance, diversity, and distribution of Arizona willow. Arizona willow and other species will benefit from the proposed conservation actions that maintain and improve healthy riparian ecosystem functions and processes.

V. RESPONSIBILITIES

A. U.S. Forest Service Shall:

1. Have primary responsibility for implementation of specific conservation actions to protect and restore Arizona willow habitat and ensure that viable populations are maintained throughout its natural range on National Forest System lands.
2. Retain Arizona willow on the Regional Forester's sensitive species list to ensure that Biological Evaluations are conducted to determine effects of planned projects within existing populations of Arizona willow or potential habitat.
3. Designate "essential habitat" for Arizona willow, where appropriate, to ensure these habitats receive special protection to maintain healthy, viable populations throughout the species natural range.
4. Seek opportunities to establish special management areas such as Botanical Areas and Research Natural Areas.
5. Seek opportunities for conservation easements and land acquisition of important private inholdings of Arizona willow populations.
6. Conduct a workload analysis to determine the budgetary and botanical staffing needs for implementing actions for Arizona willow and associated threatened, endangered, and sensitive species in their ecosystems.
7. Support the funding of studies and other scientific research developed to better understand the biology and ecology of Arizona willow.
8. Ensure NEPA analysis is completed for proposed projects in potential Arizona willow habitat that is consistent with protection and maintenance of viable

Arizona willow populations. Fully involve FWS and appropriate State agencies as cooperators or partners throughout the NEPA process for all projects likely to affect Arizona willow or its habitat.

9. In Arizona, coordinate with the AGFD in the monitoring and evaluation of ungulate grazing effects on Arizona willow, and the implementation of wildlife management strategies within Arizona willow habitat. Facilitate AGFD participation as Technical Contributors to the Arizona Willow Interagency Technical Team.
10. In Utah, coordinate with the UDWR in the monitoring and evaluation of ungulate grazing effects on Arizona willow, and the implementation of wildlife management strategies within Arizona willow habitat. Facilitate UDWR participation as Technical Contributors to the Arizona Willow Interagency Technical Team.
11. Fully implement the December 19, 1994 Regional Foresters Policy statement regarding Arizona willow conservation (Part IV, A).

B. National Park Service Shall:

1. Have primary responsibility for implementation of specific conservation actions to protect and restore Arizona willow habitat and ensure that viable populations are maintained on National Park Service lands.
2. Ensure NEPA analysis is completed on proposed projects in potential Arizona willow habitat that is consistent with protection and maintenance of viable Arizona willow populations. Fully involve FWS and appropriate State agencies as cooperators or partners throughout the NEPA process for all projects likely to affect Arizona willow or its habitat.

3. Investigate opportunities to designate a Research Natural Area or other special designation for the "CCC Camp" population in Cedar Breaks National Monument.

C. U.S. Fish and Wildlife Service Shall:

1. Provide technical assistance in the implementation of this Conservation Agreement and Strategy and ensure adequate protection and management is occurring.
2. Serve as lead agency by chairing the Arizona Willow Interagency Technical Team in scheduling coordination meetings, reviews, and development of monitoring protocol.
3. Work with State agencies with Endangered Species Act Section 6 agreements to develop studies and research projects that further the implementation of this Conservation Agreement and Strategy.
4. Pursue opportunities with private landowners to secure conservation easements to assist in protection of Arizona willow habitat on private lands.
5. Provide the U.S. Army Corps of Engineers with written documentation of Arizona willow locations and habitats on private property to ensure that Clean Water Act Section 404 permits, issued for proposed projects altering wetlands, have appropriate protective measures.
6. Coordinate with the Tribe to assist in protection and management of their Arizona willow populations.
7. In Arizona, coordinate with the AGFD for the implementation of wildlife management strategies within Arizona willow habitat. Facilitate AGFD

participation as Technical Contributors to the Arizona Willow Interagency Technical Team.

8. In Utah, coordinate with the UDWR for the implementation of wildlife management strategies within Arizona willow habitat. Facilitate UDWR participation as Technical Contributors to the Arizona Willow Interagency Technical Team.
9. Re-evaluate the need to list Arizona willow under the Endangered Species Act if agency implementation is not occurring or is inadequate to protect the species or its habitat.

D. Interagency Cooperators Shall:

1. Work together to implement this Conservation Agreement and Strategy, and manage, protect, and restore the riparian ecosystem upon which Arizona willow and other species depend. Coordinate joint studies and cooperate in shared funding opportunities.
2. Ensure, within the limits of agency authorities, outyear budgets and staffing are programmed to facilitate implementation of the actions identified for the respective agencies.
3. Prepare an annual summary report of actions scheduled for accomplishment, and any proposed amendments to the Conservation Agreement and Strategy. This information will be provided to affected parties by March of each year.
4. Provide representation on the Arizona Willow Interagency Technical Team from each management unit to monitor implementation, develop monitoring protocol, hold annual coordination meetings, conduct field reviews, provide annual reports, and make recommendations to the Regional Foresters and

Regional Directors on any proposed amendments to the Conservation Agreement and Strategy.

5. Keep all signatories and other affected parties informed of the status of the implementation or modification of the agreement.
6. Fully involve the FWS and appropriate State agencies as cooperators or partners throughout the NEPA process for all projects likely to affect Arizona willow or its habitat.
7. Implement their portions of the Arizona willow conservation actions identified below.

Conservation Actions:

Various types of actions are required to implement the Arizona Willow Conservation Agreement and Strategy. Many actions are designed to eliminate, reduce, or mitigate adverse effects, and others to conserve Arizona willow ecosystems. Priority actions to remove immediate threats and stabilize populations include fencing, exclosures, cages, application of riparian management objectives, and rested pastures. Other actions consist of baseline data collection, population trend monitoring, inventories for new populations, research, and special management area designation. Each agency also has administrative responsibilities to oversee the implementation of the Arizona Willow Conservation Agreement and Strategy. The following actions are intended to remove immediate threats or establish baseline data to assess other limiting factors. It should be noted that any combination of resources may be used to complete these conservation actions.

1. Fences (Barbed or Electric)

Four populations in Arizona and three populations in Utah have protection fences to protect Arizona willow ecosystems from negative impacts due to grazing by domestic livestock. Specific details for these populations are found in Table 1, and in Part III, Conservation Strategy, Outline of Conservation Actions.

2. Exclosures

The Stinky Creek population in Arizona and four populations in Utah will have exclosures. These exclosures consist of fenced areas to study the effects of wildlife use, livestock use, and combined use compared to areas excluded from all use by large herbivores. Details for these populations are found in Table 2, and in Part III, Conservation Strategy, Outline of Conservation Actions.

3. Cages

Cages are an interim protection action to exclude direct impacts from ungulates. Cages will enclose individual plants, or groups of plant units, and will generally be approximately eight feet square, though this may vary from site to site. Cages will be used on a temporary basis while land management planning processes, including revisions of allotment management plans, are completed, or as part of research efforts. Cages will be used within eight of the 15 populations on the Apache-Sitgreaves NFs, and within three populations in Utah. Details for these populations are found in Table 3, and in Part III, Conservation Strategy, Outline of Conservation Actions.

4. Riparian Management

Special attention will be given to assessing potential impacts from recreation, livestock management, wildlife, riparian improvement projects, and other proposed actions, and the implementation of riparian area standards and guidelines established in the Southwestern and Intermountain Forest Plans. Details for these populations are found in Table 4, and in Part III, Conservation Strategy, Outline of Conservation Actions.

5. Rested Pastures

Seven of the 15 populations on the Apache-Sitgreaves NFs are located in pastures which will be rested from livestock use until the Greer and Voigt Allotment Management Plans (AMPs) are revised within the provisions established by this Conservation Agreement and Strategy. The need for continued rest will be re-evaluated as part of the AMP development process. The Greer and Voigt AMPs are targeted for completion in October 1996 if the decision is made to stock the allotment. Detailed actions for these populations are found in Table 5, and in Part III, Conservation Strategy, Outline of Conservation Actions.

6. Baseline Data Collection and Population Trend Monitoring

Detailed actions for data collection and population monitoring actions are found in Part III, Conservation Strategy, Outline of Conservation Actions.

Standardized monitoring protocol will be developed in cooperation with all affected parties before annual monitoring begins in the 1995 field season.

Arizona: All 15 populations on the Apache-Sitgreaves NFs will be monitored on a short- and long-term basis (see Part III). All small populations will be monitored at 100 percent. The number of plants monitored within larger populations will depend on the size of the population. Monitoring activities are estimated to cost \$3,500 per year. Intensive monitoring will be done on all Forest populations every ten years to assess trends, at an estimated cost of \$8,000. Results will be reviewed to revise management actions (e.g. modification of annual operating plan) and long-term monitoring protocols, if necessary.

Utah: All 20 populations in Utah will receive short- and long-term monitoring (see Part III). Short-term monitoring will consist of baseline data collection through the year 1997. Short-term monitoring will be conducted annually through 1997. To complete this short-term monitoring it is estimated to cost a minimum of \$22,700 in 1995, \$14,400 in 1996, \$16,200 in 1997, \$7,900 in 1998, and \$7,900 in 1999. Long-term monitoring will begin in the year 2000 and is estimated to cost \$18,800. Prior to initiating long-term monitoring, results from short-term monitoring will be reviewed and new monitoring protocols, implementation schedules, and budgets developed, if necessary.

7. Inventory for New Populations

Virtually all potential habitat for Arizona willow on the Apache-Sitgreaves NFs has been surveyed based on an assessment of current habitat conditions. At five year intervals, additional surveys should be undertaken to see if Arizona willow has expanded into previously unoccupied habitat. The willow was rediscovered in Utah in 1994, and additional potential habitat occurs on the Dixie and Fishlake NFs. It is planned that during the next three years high priority habitat on these two Forests will be surveyed. To complete these surveys and data analysis, the Dixie and Fishlake NFs will each need approximately

\$30,000 per year to survey all high priority areas within the 3-year period. Baseline data will be gathered for any new populations found. Negative survey results also provide valuable information and will be filed at the District and Forest level. All positive and negative results will be submitted to state Natural Heritage Programs for inclusion into these databases.

Surveys for new Arizona willow populations need to be conducted beyond the boundaries of the three Forests. If Arizona willow is discovered on other Forests, thorough inventories will be undertaken. Potential habitat may occur on the San Francisco Peaks on the Coconino NF, and on National Forests in New Mexico, western Colorado, and southern Utah (Figure 2).

8. Studies/Research

Little is known about the biology and ecology of Arizona willow. Specific research is needed in the following areas: life history studies, ecology, the relationships to plant community succession and soil development, utilization by animals, diseases and insects, population dynamics, and DNA analysis to determine which populations are most appropriate for essential habitat designation. To conduct a DNA analysis for populations in Arizona and Utah, a minimum of \$25,000 will be required in 1995.

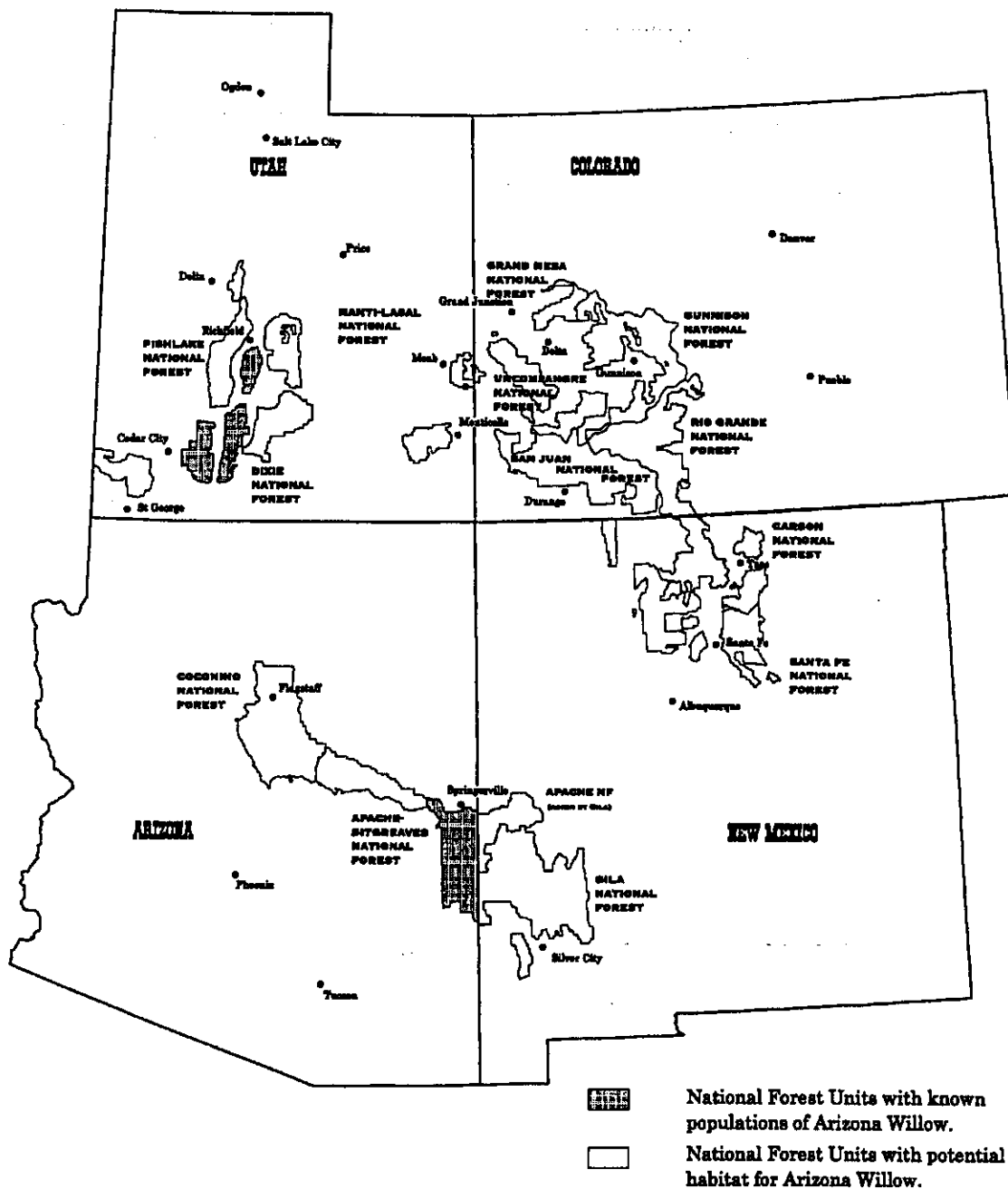


Figure 2. National Forest administrative units with known or potential habitat for Arizona willow (*Salix arizonica*).

9. Administration

The implementation of the Arizona Willow Conservation Agreement and Strategy requires staff time from various agency administrative units for participation on the Arizona Willow Interagency Technical Team. Also included are aspects of technical supervision, review and evaluation, programming of budgets, and project administration for Arizona willow. The estimated costs for administrative functions are reflected in Tables 6 and 7, which also provide a summary of other fiscal commitments by year, through fiscal year 2000. These costs are summarized and include costs incurred by: FS Regional Offices, National Forest Supervisors Offices, Ranger District Offices; Fish and Wildlife Service Regional Offices and Ecological Services State Offices; and National Park Service Cedar Breaks National Monument.

Table 1. Summary of Conservation Actions -- Fences. (*) Little Colorado Ecosystem Unit; primary cost of AMP attributed to Arizona willow.

Location	Effectiveness Monitoring	Responsibility	Action/Duration	Estimated Cost
ARIZONA Lee Valley Reservoir to Colter Reservoir Phelps	1. Annual monitoring of fence effectiveness and maintenance. 2. Monitoring plants continues.	Apache-Sitgreaves NFs	Monitor annually.	New fencing \$800 FY1995 Monitor \$200/yr to FY2000 LCEU(*) AMP \$500/yr FY1995/FY1996
	1. Annual monitoring of fence effectiveness and maintenance. 2. Monitoring plants continues.	Apache-Sitgreaves NFs	AMP revision targeted for Oct 1996	Fencing maintenance \$500/year. Monitor \$200/yr to FY2000 LCEU(*) AMP \$500/yr FY1995/FY1996
	1. Annual monitoring of fence effectiveness and maintenance. 2. Monitoring plants continues.	Apache-Sitgreaves NFs	Monitor annually.	
	1. Annual monitoring of fence effectiveness and maintenance. 2. Monitoring plants continues.	Apache-Sitgreaves NFs	AMP revised by 10/96	
Thompson Ranch Below Thompson	1. Annual monitoring of fence effectiveness and maintenance. 2. Monitoring plants continues.	Apache-Sitgreaves NFs	Monitor annually.	Fencing \$6000 FY1995 Monitor \$200/yr to FY2000
	1. Annual monitoring of fence effectiveness and maintenance. 2. Monitoring plants continues.	Apache-Sitgreaves NFs	Monitor annually.	Fencing \$12,650 FY1995 Monitor \$200/yr to FY2000
	1. Annual monitoring of fence effectiveness and maintenance. 2. Monitoring plants continues.	Apache-Sitgreaves NFs	Monitor annually.	
	1. Annual monitoring of fence effectiveness and maintenance. 2. Monitoring plants continues.	Apache-Sitgreaves NFs	Monitor annually.	
UTAH Sidney Valley	1. Annual monitoring of fence effectiveness and maintenance. 2. Monitoring plants continues.	Dixie NF	Monitor annually through 2000, then re-evaluate.	\$100/yr FY1995-2000
	1. Annual monitoring of fence effectiveness and maintenance. 2. Monitoring plants continues.	Dixie NF	Baseline data collection in 1995. Take photos through 1997, then again in year 2000, then re-evaluate.	\$2000 in FY1995 \$500 in FY1996 \$500 in FY1997 \$1000 in FY2000
	1. Annual monitoring of fence effectiveness and maintenance. 2. Monitoring plants continues.	Dixie NF	Reconstruction of fence in 1995.	\$500 in FY1995
	1. Annual monitoring of fence effectiveness and maintenance. 2. Monitoring plants continues.	Dixie NF	Re-evaluate in 1996.	\$200 in FY1996
Crystal Springs	1. Monitor effectiveness of pole fence surrounding spring. 2. Monitor effectiveness of pole fence.	Fishlake NF	Completion of fence in 1995 Monitor annually 1996-2000 Baseline data collection 1995; Take photos through 1997, again in 2000, then re-evaluate.	\$20,000 in FY1995 \$500/yr FY1996-2000 \$2500 in FY1995 \$1500 in FY1996 \$1500 in FY1997 \$2000 in FY2000
	1. Monitor effectiveness of pole fence surrounding spring. 2. Monitor effectiveness of pole fence.	Fishlake NF	Completion of fence in 1995 Monitor annually 1996-2000 Baseline data collection 1995; Take photos through 1997, again in 2000, then re-evaluate.	
	1. Monitor effectiveness of pole fence surrounding spring. 2. Monitor effectiveness of pole fence.	Fishlake NF	Completion of fence in 1995 Monitor annually 1996-2000 Baseline data collection 1995; Take photos through 1997, again in 2000, then re-evaluate.	
	1. Monitor effectiveness of pole fence surrounding spring. 2. Monitor effectiveness of pole fence.	Fishlake NF	Completion of fence in 1995 Monitor annually 1996-2000 Baseline data collection 1995; Take photos through 1997, again in 2000, then re-evaluate.	
Seven Mile Creek	1. Construct let down fence. Annually monitor effectiveness of let down fence. 2. Establish photo monitoring plots.	Fishlake NF	Completion of fence in 1995 Monitor annually 1996-2000 Baseline data collection 1995; Take photos through 1997, again in 2000, then re-evaluate.	\$20,000 in FY1995 \$500/yr FY1996-2000 \$2500 in FY1995 \$1500 in FY1996 \$1500 in FY1997 \$2000 in FY2000

Table 2. Summary of Conservation Actions -- Exclosures.

Location	Effectiveness Monitoring	Responsibility	Action/Duration	Estimated Cost
ARIZONA Stinky Creek	1. Annual monitoring of exclosure fence effectiveness and maintenance needs. 2. Photo points, C&T Transects.	Apache-Sitgreaves NFs	Monitor annually.	Fence \$5000 in FY1995 to install 3-way exclosure. Monitor \$500/yr to FY2000
UTAH Lowder Pond	1. Annual monitoring of exclosure effectiveness. 2. Baseline data collection.	Apache-Sitgreaves NFs	Monitor annually through 2000, then re-evaluate. Annually through 1997, then again in year 2000, then re-evaluate.	\$500/yr FY1995-1999 \$1000 in FY2000 \$2500 in FY1995 \$1500 in FY1996 \$1500 in FY1997 \$2000 in FY2000
Sheep Herder	1. Annual monitoring of exclosure effectiveness. 2. Baseline data collection.	Dixie NF Dixie NF	Monitor annually through 2000, then re-evaluate. Annually through 1997, then again in year 2000, then re-evaluate.	\$500/yr FY1995-1999 \$1000 in FY2000 \$2500 in FY1995 \$1500 in FY1996 \$1500 in FY1997 \$2000 in FY2000
East Fork of Sevier River	1. Annual monitoring of exclosure effectiveness. 2. Baseline data collection.	Dixie NF Dixie NF	Monitor annually through 1997, then re-evaluate. Annually through 1997, then again in year 2000, then re-evaluate.	\$500/yr FY1995-1999 \$1000 in FY2000 \$2500 in FY1995 \$1500 in FY1996 \$1500 in FY1997 \$2000 in FY2000
Seven Mile Creek	1. Annual monitoring of exclosure effectiveness. 2. Baseline data collection.	Fishlake NF Fishlake NF	Construct in 1995. Monitor 1996-1999. Re-evaluate in 2000. Annually through 1997, then again in year 2000, then re-evaluate.	\$7000 in FY1995 \$1000 in FY1996 \$500/yr FY1997-1999 \$1500 in FY2000 \$3000 in FY1995 \$2000 in FY1996 \$2000 in FY1997 \$2500 in FY2000

Table 3. Summary of Conservation Actions – Cages.

(*) Little Colorado Ecosystem Unit; primary cost of AMP attributed to Arizona willow.

Location	Effectiveness Monitoring	Responsibility	Action/Duration	Estimated Cost
ARIZONA Reservation Boundary	Annual monitoring of cage effectiveness.	Apache-Sitgreaves NFs	Annual inspection. AMP revised by 10/96.	New cages \$350 in FY1995 LCEU(*) AMP \$500/yr FY1995/FY1996
Sheeps Crossing	Annual monitoring of cage effectiveness.	Apache-Sitgreaves NFs	Annual inspection. AMP revised by 10/96.	New cages \$400 in FY1995 Monitor 200/yr to FY2000 LCEU(*) AMP \$500/yr FY1995/FY1996
Lee Valley Reservoir to Colter Reservoir	Annual monitoring of cage effectiveness.	Apache-Sitgreaves NFs	Annual inspection. AMP revised by 10/96.	New cages \$500 in FY1995
Voigt Cabin	Annual monitoring of cage effectiveness.	Apache-Sitgreaves NFs	Annual inspection. AMP revised by 10/96.	New cages \$450 in FY1995 Monitor \$200/yr to FY2000 LCEU(*) AMP \$500/yr FY1995/FY1996
East Fork LCR below Phelps to Colter Reservoir	Annual monitoring of cage effectiveness.	Apache-Sitgreaves NFs	Annual inspection. AMP revised by 10/96.	New cages \$3600 in FY1995 LCEU(*) AMP \$500/yr FY1995/FY1996
East Fork LCR below Colter Reservoir	Annual monitoring of cage effectiveness.	Apache-Sitgreaves NFs	Annual inspection. AMP revised by 10/96.	New cages \$500 in FY1995 Monitor \$200/yr to FY2000 LCEU(*) AMP \$500/yr FY1995/FY1996
Thompson Ranch	Annual monitoring of cage effectiveness.	Apache-Sitgreaves NFs	Annual inspection.	New cages \$1000 in FY1995
Below Thompson Ranch	Annual monitoring of cage effectiveness.	Apache-Sitgreaves NFs	Annual inspection.	New cages \$1000 in FY1995

Table 3. Continued -- Cages.

Location	Effectiveness Monitoring	Responsibility	Action/Duration	Estimated Cost
UTAH CCC Camp (Dixie NF portion)	1. Annual monitoring of effectiveness of caged plants. 2. Establish photo monitoring plots.	Dixie NF Dixie NF	Monitor annually through 2000, then re-evaluate. Baseline data collection in 1995. Take photos through 1997, then again in year 2000, then re-evaluate.	\$500/yr FY1995-1999 \$800 in FY2000 \$1500 in FY1995 \$500 in FY1996 \$500 in FY1997 \$1000 in FY2000
(NPS portion)	Establish photo monitoring plots.	Cedar Breaks National Monument	Baseline data collection in 1995. Take photos through 1997, then again in year 2000, then re-evaluate.	\$500/yr FY1995-1999 \$300 in FY2000

Table 4. Summary of Conservation Actions -- Riparian Management.

Listed are locations where vegetation management projects and other scheduled activities may occur within the next 5 years.

Location	Effectiveness Monitoring	Responsibility	Action/Duration	Estimated Cost
ARIZONA				
Sheeps Crossing	1. Monitor effectiveness of Forest Standards and Guidelines	Apache-Sitgreaves NFs	ADOT road realignment, bridged crossing, parking area.	\$1000-5000
West Fork LCR in Wilderness	1. Monitor effectiveness of Forest Standards and Guidelines	Apache-Sitgreaves NFs	Trail realignment.	\$500-1000 (partially completed)
Stinky Creek	1. Monitor effectiveness of Forest Standards and Guidelines	Apache-Sitgreaves NFs	Timber harvest.	\$0-5000
East Fork LCR below Phelps	1. Monitor effectiveness of Forest Standards and Guidelines	Apache-Sitgreaves NFs	Relocation of campground and horse coral facilities.	\$1000-5000
Livestock allotments in potential Arizona willow habitat	1. Monitor effectiveness of Forest Plan standards and guidelines.	Apache-Sitgreaves NFs	Monitor utilization standards.	As part of normal range administration activities.
Recreation activities in potential Arizona willow habitat.	1. Monitor effectiveness of Forest Plan standards and guidelines.	Apache-Sitgreaves NFs	Monitor associated impacts.	As part of normal program administration activities.
Riparian improvement projects in potential Az willow habitat.	1. Monitor effectiveness of Forest Plan standards and guidelines.	Apache-Sitgreaves NFs	Monitor associated impacts.	As part of normal program administration activities.
UTAH				
Bunker Creek	1. Monitor layout and design of 100' riparian buffer. 2. Monitor effectiveness of 100' riparian buffer.	Dixie NF Dixie NF	Timber harvest.	\$1000-4000 \$2000-5000
Castle Creek	1. Monitor layout and design of 100' riparian buffer. 2. Monitor effectiveness of 100' riparian buffer.	Dixie NF Dixie NF	Timber harvest.	\$2000-5000 \$3000-5000
East Fork of Sevier River	1. Monitor layout and design of 100' riparian buffer. 2. Monitor effectiveness of 100' riparian buffer.	Dixie NF Dixie NF	Timber harvest.	\$1000-4000 \$2000-4000

Table 4. Continued -- Riparian Management.

Location	Effectiveness Monitoring	Responsibility	Action/Duration	Estimated Cost
Hancock Peak	1. Monitor layout and design of 100' riparian buffer. 2. Monitor effectiveness of 100' riparian buffer.	Dixie NF Dixie NF	Timber harvest.	\$2000-4000 \$3000-4000
Lowder Creek	1. Monitor layout and design of 100' riparian buffer. 2. Monitor effectiveness of 100' riparian buffer.	Dixie NF Dixie NF	Timber harvest.	\$2000-3000 \$3000-5000
Midway Face	1. Monitor layout and design of 100' riparian buffer. 2. Monitor effectiveness of 100' riparian buffer.	Dixie NF Dixie NF	Timber harvest.	\$1000-1500 \$2000-3000
Rainbow Meadows	1. Monitor layout and design of 100' riparian buffer. 2. Monitor effectiveness of 100' riparian buffer.	Dixie NF Dixie NF	Timber harvest.	\$1000-2000 \$2000-5000
Sidney Valley	1. Monitor layout and design of 100' riparian buffer. 2. Monitor effectiveness of 100' riparian buffer.	Dixie NF Dixie NF	Timber harvest.	\$2000-6000 \$3000-6000
Seven Mile Creek	1. Monitor special riparian management areas as described in Fishlake LRMP IV-33-35:91	Fishlake NF	Road realignment.	\$1500
Livestock allotments in potential Arizona willow habitat.	1. Monitor effectiveness of Forest. Plan standards and guidelines.	Dixie NF/Fishlake NF	Monitor utilization standards.	As part of normal range administration activities.
Recreation activities in potential Arizona willow habitat.	1. Monitor effectiveness of Forest. Plan standards and guidelines.	Dixie NF/Fishlake NF	Monitor associated impacts.	As part of normal program administration activities.
Riparian improvement projects in potential Az willow habitat.	1. Monitor effectiveness of Forest. Plan standards and guidelines.	Dixie NF/Fishlake NF	Monitor associated impacts.	As part of normal program administration activities.

Table 5. Summary of Conservation Actions Schedule -- Rested pastures. (") Little Colorado Ecosystem Unit; primary cost of AMP attributed to Arizona willow.

Location	Effectiveness Monitoring	Responsibility	Action/Duration	Estimated Cost
ARIZONA Reservation Boundary	Annual monitoring of pasture resting effects, special needs.	Apache-Sitgreaves NFs	Annually until AMPs done by 10/96, then re-evaluate	Monitor \$200/yr to FY2000
Hall Creek	Annual monitoring of pasture resting effects, special needs.	Apache-Sitgreaves NFs	Annually until AMPs done by 10/96, then re-evaluate	Monitor \$200/yr to FY2000 LCEU(") AMP \$500/yr FY1995/FY1996
West Fork LCR in Wilderness	Annual monitoring of pasture resting effects, special needs.	Apache-Sitgreaves NFs	Annually until AMPs done by 10/96, then re-evaluate	Monitor \$400/yr to FY2000 LCEU(") AMP \$500/yr FY1995/FY1996
Above Lee Valley Reservoir	Annual monitoring of pasture resting effects, special needs.	Apache-Sitgreaves NFs	Annually until AMPs done by 10/96, then re-evaluate	Monitor \$200/yr to FY2000 LCEU(") AMP \$500/yr FY1995/FY1996
South Tributary of East Fork LCR above Phelps	Annual monitoring of pasture resting effects, special needs.	Apache-Sitgreaves NFs	Annually until AMPs done by 10/96, then re-evaluate	Monitor \$200/yr to FY2000 LCEU(") AMP \$500/yr FY1995/FY1996
East Fork LCR above Phelps	Annual monitoring of pasture resting effects, special needs.	Apache-Sitgreaves NFs	Annually until AMPs done by 10/96, then re-evaluate	Monitor \$200/yr to FY2000 LCEU(") AMP \$500/yr FY1995/FY1996
East Fork LCR below Phelps to Colter Reservoir	Annual monitoring of pasture resting effects, special needs.	Apache-Sitgreaves NFs	Annually until AMPs done by 10/96, then re-evaluate	Monitor 200/yr to FY2000 LCEU(") AMP \$500/yr FY1995/FY1996

Table 6. Summary of projected Forest Service fiscal needs (in \$1,000s) for Arizona willow conservation actions.

Action	Apache-Sitgreaves NFs						Dixie NF						Fishlake NF					
	FY95	FY96	FY97	FY98	FY99	FY00	FY95	FY96	FY97	FY98	FY99	FY00	FY95	FY96	FY97	FY98	FY99	FY00
Fences	21	1.5	0.5	0.5	0.5	0.5	2.6	0.8	0.6	0.1	0.1	1.1	22.5	2	2	0.5	0.5	2.5
Exclosures	5						9	6	6	1.5	1.5	9	10	3	2.5	0.5	0.5	4
Cages	10.3	2.5					2	1	1	0.5	0.5	1.8						
Rested Pastures	3																	
Data Collection Pop. Monitoring	3.5	3.5	3.5	3.5	3.5	3.5	22.2	13.9	15.7	6.9	6.9	15.3	0.5	0.5	0.5	1	1	3.5
Inventory							30	30	15				30	30	15			
Studies/ Research	7						6						2					
Administration	10	6	4	3	3	3	12	8	6	3	3	6	10	6	3	2	2	4
Totals	59.8	13.5	8	7	7	7	83.8	59.7	44.3	12	12	32.2	75	41.5	23	4	4	14

Table 7. Summary of projected National Park Service and Fish and Wildlife Service fiscal needs (in \$1,000s) for Arizona willow conservation actions.

Action	NPS Cedar Breaks National Monument						FWS Southwest Region						FWS Prairie-Mountain Region					
	FY95	FY96	FY97	FY98	FY99	FY00	FY95	FY96	FY97	FY98	FY99	FY00	FY95	FY96	FY97	FY98	FY99	FY00
Fences																		
Exclosures																		
Cages	0.5	0.5	0.5	0.5	0.5	0.3												
Rested Pastures																		
Data Collection Pop. Monitoring																		
Inventory																		
Studies/ Research							22	16	16				4					
Administration	0.2	0.2	0.2	0.2	0.2	0.2	14	10	6	6	6	8	6	3	2	2	2	3
Totals	0.7	0.7	0.7	0.7	0.7	0.5	36	26	22	6	6	8	10	3	2	2	2	3

VI. AGREEMENT TERM:

This agreement shall remain in force for a period of ten years. The Arizona Willow Conservation Agreement and Strategy will be reviewed and amended as needed.

VII. SPECIAL PROVISIONS:

- A. This Agreement may be modified or amended as necessary upon review of the proposed amendments by the Arizona Willow Interagency Technical Team and written consent of all parties. This agreement may be terminated by any party with a 60 day written notice to all other parties.
- B. This Agreement is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement or contribution of funds among the parties of this agreement will be handled in accordance with applicable laws, regulations, and procedures.
- C. Principal contacts for this Agreement are the members of the Arizona Willow Interagency Technical Team.

VIII. NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) AND NATIONAL FOREST MANAGEMENT ACT (NFMA) COMPLIANCE

Prior to completion of the proposed Arizona Willow Conservation Agreement and Strategy, the respective environmental planners for the Intermountain and Southwestern Regions of the FS and the three participating Forests reviewed the draft content of the Arizona Willow Conservation Agreement and Strategy for NEPA and NFMA compliance.

Current Forest Land and Resource Management Plans (LRMP) and amendments were reviewed for program management direction, and standards and guidelines that would be applicable to the protection, conservation, and management of Arizona willow populations located on National Forest System lands. Many standards and guidelines contained in the Forest LRMPs establish

direction and authority to ensure the long-term conservation of Arizona willow (Appendix A, B, and C). Short-term actions to remove immediate threats to Arizona willow met NEPA and NFMA compliance standards and were within the management authority of Federal officials to implement immediately. Long-term actions may need additional NEPA analysis and review, and will be incorporated into LRMP amendments as necessary.


To reinforce a proactive and comprehensive approach for immediate conservation action in known Arizona willow habitats, a joint policy statement was issued on December 19, 1994 by the FS Regional Foresters of the Intermountain and Southwestern Regions. The Arizona willow policy statement outlines the following: Forest LRMP standards and guidelines implementation, special resource protections, public information, future public and agency participation in the NEPA process, and designation of FS representatives on the Arizona Willow Interagency Technical Team.

IX. FEDERAL ADVISORY COMMITTEE ACT (FACA) COMPLIANCE

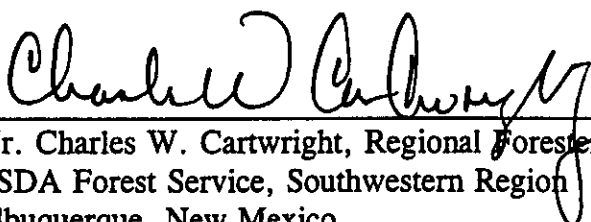
Membership on the Arizona Willow Interagency Technical Team is restricted to employees of the U.S. Forest Service, U.S. Fish and Wildlife Service, and National Park Service. Expertise was widely sought for inclusion from Technical Contributors as special needs were identified. Appropriate line officer authority for decision documents, resource allocation, personnel, and budgetary management has been retained by the responsible federal officials.

In Witness Whereof, the parties have caused this Arizona Willow Conservation Agreement to be executed as of the date of last signature below:

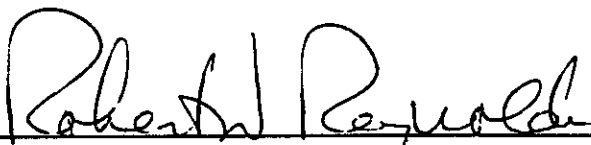
APPROVED:


Mr. Dale N. Bosworth, Regional Forester
USDA Forest Service, Intermountain Region
Ogden, Utah

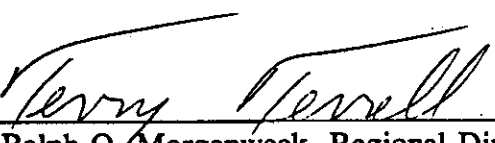
Date: 4/5/95


Mr. Charles W. Cartwright, Regional Forester
USDA Forest Service, Southwestern Region
Albuquerque, New Mexico

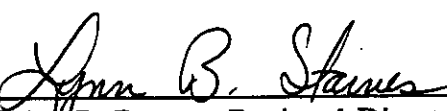
Date: 4/7/95

for 
Mr. John E. Cook, Regional Director
USDI National Park Service, Rocky Mountain Region
Denver, Colorado

Date: 4/6/95

for 
Mr. Ralph O. Morgenweck, Regional Director
USDI Fish and Wildlife Service, Mountain-Prairie Region
Denver, Colorado

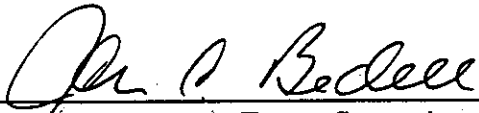
Date: 4/6/95

acting 
Dr. John G. Rogers, Regional Director
USDI Fish and Wildlife Service, Southwest Region
Albuquerque, New Mexico

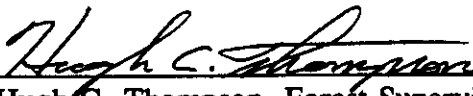
Date: 4/7/95

Arizona Willow Conservation Agreement and Strategy

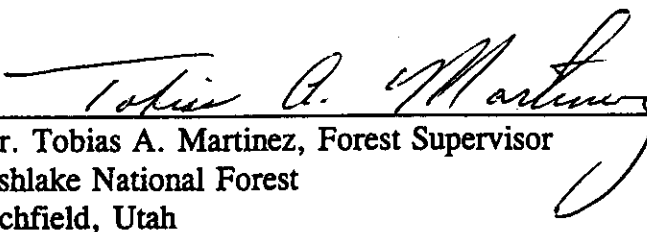
REVIEWED:


Mr. John C. Bedell, Forest Supervisor
Apache-Sitgreaves National Forests
Springerville, Arizona


Date: 4/3/95


Mr. Hugh C. Thompson, Forest Supervisor
Dixie National Forest
Cedar City, Utah

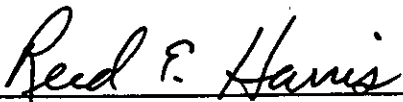
Date: 4/4/95


Mr. Tobias A. Martinez, Forest Supervisor
Fishlake National Forest
Richfield, Utah


Date: 4/4/95


Mr. Thomas E. Henry, Superintendent
Cedar Breaks National Monument
Cedar City, Utah

Date: 4/4/95


Mr. Reed E. Harris, Field Supervisor
Utah Ecological Service Field Office
Salt Lake City, Utah

Date: 4/4/95


Mr. Sam F. Spiller, State Supervisor
Arizona Ecological Service State Office
Phoenix, Arizona

Date: 4/7/95

PART II

ARIZONA WILLOW CONSERVATION ASSESSMENT

ARIZONA WILLOW CONSERVATION ASSESSMENT

I. INTRODUCTION

This conservation assessment presents the existing data available for Arizona willow in Arizona and Utah. The biology of the species, including its description, distribution, and habitat, are discussed within the current environmental setting. Land uses, habitat modification, and impacts from past and current threats are evaluated. Current protection mechanisms available to Arizona willow are reviewed.

While our understanding of the ecology, biology, and management needs of Arizona willow are insufficient to produce a conclusive assessment and strategy, this document has been developed using all available data and provides the initial direction for conservation until more information is available.

II. NOMENCLATURE AND DESCRIPTION

A previously undescribed species of willow occurring in high elevation riparian areas in the vicinity of Mount Baldy, in the White Mountains of east-central Arizona, was first recognized as a distinct form by Granfelt in 1969 (Phillips *et al.* 1982). Dorn (1975) described these plants as a new species, *Salix arizonica*, commonly known as Arizona willow, a member of the willow family (Salicaceae).

Although described as shrubby by Dorn (1975), Arizona willow exhibits several growth forms, including scraggly shrub, rounded shrub, prostrate mat or single stem, and large hedge or thicket. Plants may occasionally reach a height of 3 meters (m) (10 feet) or be as short as 1 centimeter (cm) (0.5 inches), but more typically are less than 0.75 m (2 feet) (Galeano-Popp 1988) to approximately 1.3 m (4 feet) in height. The mature leaves are ovate (egg-shaped) to broadly elliptic or obovate, with a rounded or cordate (heart-shaped) base, and 1.5 to 2.4 times as long as wide. The leaves are 1-5 cm (0.5-2.5 inches) in length and 0.5-3 cm (0.2-1.5 inch) in width. The short-petiolate (petiole 3-7.5 mm [0.1-0.3 inch] long) leaf has gland-tipped, finely

serrate (toothed) margins (7-21 teeth or glands per cm). The midrib of the leaf tends to remain pubescent, while the rest of the upper surface of the mature leaf is slick and shiny, and usually glabrous (non-haired). The lower leaf surface is non-glaucous. Leaves on rapidly growing sucker shoots may be much larger but still maintain the mature leaf length to width ratio.

Pistillate (female) catkins are densely flowered, 1-4.5 cm (0.5-2 inch) long, with glabrous ovaries. The inflorescence has brown, black, or bicolor floral bracts 1-2.5 mm long, with wavy hairs and acute tips (Dorn 1975). The branches of the year are yellow-green, red-brown, or brownish in color and are pilose (densely haired). The branches from the previous years growth are usually bright red, and help to distinguish this species from other willow species in the area (Figure 3).

III. DISTRIBUTION

As of March 1995, the distribution of Arizona willow is known to include four widely disjunct areas: the Mount Baldy vicinity of the White Mountains in east-central Arizona; and from south-central Utah, on the Markagunt Plateau in the vicinity of Brian Head Peak, the Paunsagunt Plateau along the East Fork of the Sevier River, and the Seven Mile Creek drainage on the Fishlake Plateau (Part I, Figure 1).

In Arizona, Arizona willow is known only from the vicinity of Mount Baldy, on Federal land managed by the Apache-Sitgreaves National Forests (Apache-Sitgreaves NFs) on the Springerville Ranger District, and on the Fort Apache Indian Reservation (Reservation). A small amount of Arizona willow habitat occurs on private land.

Intensive surveys conducted in Arizona on the Apache-Sitgreaves NFs (Galeano-Popp 1988) and Reservation (Granfelt 1989a) have found Arizona willow to occur in 15 to 20 drainages that generally flow to the north, east, or south from Mount Baldy. The species is found within very limited habitats at elevations above 2,600 m (8,500 feet) in Arizona within a geographic area of approximately 13.5 kilometers (8.5 miles) to the east and west, and approximately 22 kilometers (13.5 miles) to the north and south, a total range of approximately 300 square kilometers (km) (115 square miles) (Galeano-Popp 1988).

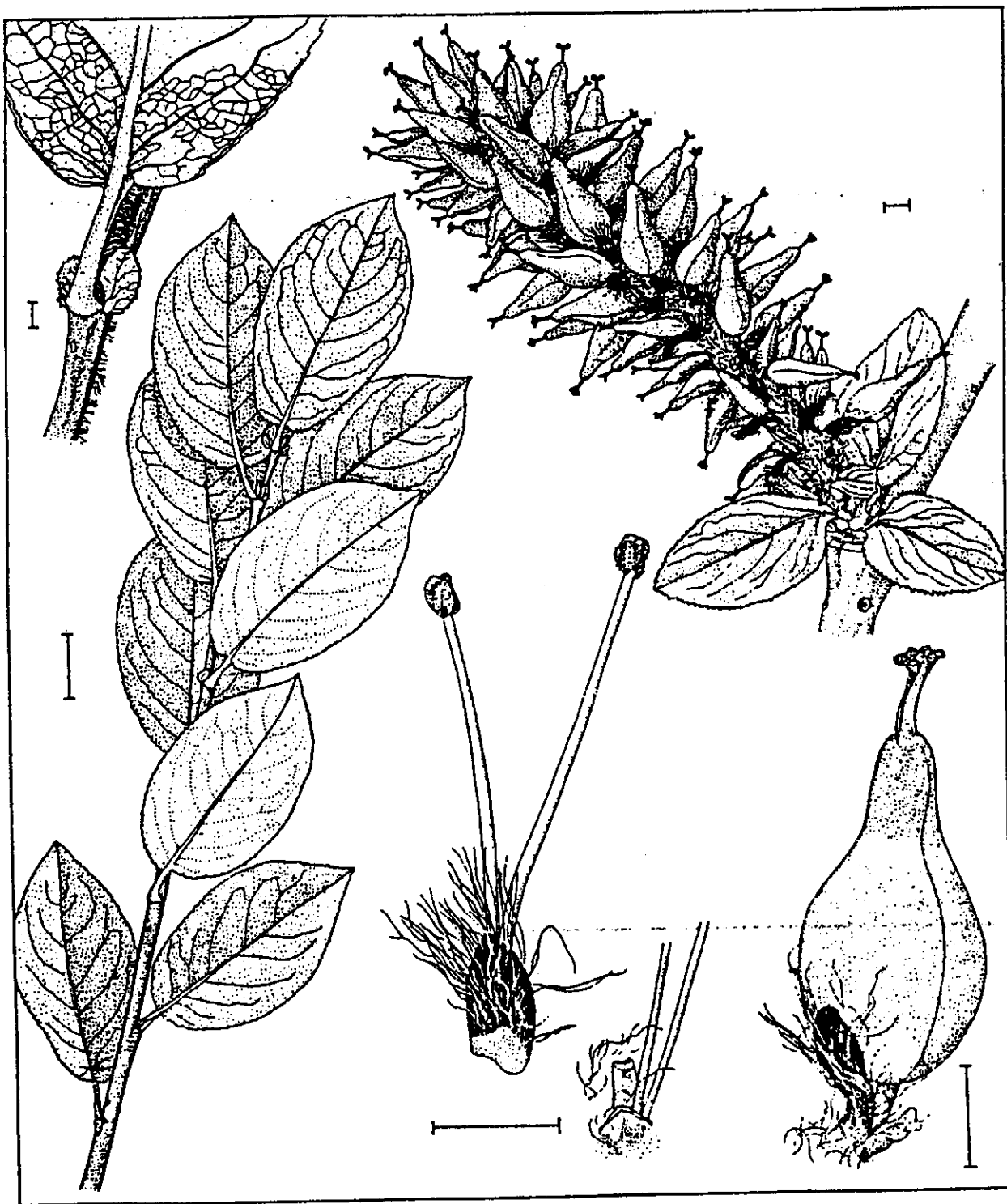


Figure 3. Arizona willow (*Salix arizonica*) morphological characteristics. From G. Argus, Canadian Museum of Nature, Ottawa, Ontario, Canada, with permission. The scale bars shown are as follows: upper left 1 mm; upper right 1 mm; center left 1 cm; bottom center 1 mm; bottom right 1 mm.

Dorn (1975) conducted extensive field work in much of western North America and examined thousands of herbarium specimens as part of his taxonomic revision of the section *Cordates* of the genus *Salix* (willow species) in North America. Surveys and status assessments for Arizona willow have been conducted in the vicinity of the White Mountains by Fletcher (1978), Phillips *et al.* (1982), Galeano-Popp (1988), and Granfelt (1989a and 1989b). Galeano-Popp (1988) and Granfelt (1989b) specifically surveyed for Arizona willow outside of its known range within the White Mountains complex. Additionally, Argus (*in litt.* 1991), while investigating the taxonomic relationship between *S. arizonica* and *S. boothii*, examined numerous specimens of these easily confused species. As part of these investigations by Argus and Dorn, an herbarium specimen collected in 1913 from Utah and incorrectly identified as black willow (*S. pseudomyrsinites* Andersson), was annotated by Dorn as *S. arizonica*.

In June of 1993, the U.S. Fish and Wildlife Service (FWS) was notified about the previously misidentified specimen of Arizona willow collected in 1913 from high elevation habitats of the then named "Sevier Forest" in southern Utah (Argus *in litt.* 1993). The Sevier Forest is now included in the Dixie National Forest (Dixie NF). Though the specimen collection data was incomplete, preliminary surveys were conducted in Utah during the summer of 1993 by FWS. No Arizona willow were found (England pers. comm. 1993). After notification of the early Utah collection, the USDA Forest Service (FS) initiated surveys in June of 1994 resulting in the "rediscovery" of Arizona willow on Cedar Mountain, Cedar City Ranger District, Dixie NF on June 30, 1994 (Rodriguez *et al.* 1995). Subsequent surveys during the summer and fall of 1994 documented additional Arizona willow populations on the Cedar City and Powell Ranger Districts of the Dixie NF, on the Loa Ranger District of the Fishlake National Forest (Fishlake NF), on Cedar Breaks National Monument, and adjacent private land. Dorn confirmed the identity of the Utah populations as Arizona willow as part of field investigations in August of 1994 (Rodriguez *et al.* 1995) (Appendix D). These populations of Arizona willow discovered in Utah during the 1994 field season add significant "new data" on the species distribution and status.

Based on three months of survey data in Utah, Arizona willow has been documented from three general locations. The largest populations (10) are found on the Markagunt Plateau in the

vicinity of Brian Head Peak, within the Dixie NF, Cedar Breaks National Monument, and private land. This geographic area is approximately 24 km (15 miles) in diameter. The second location includes one very small population located on the Paunsagunt Plateau within the watershed of the East Fork of the Sevier River on the Dixie NF. The third area is on the Fishlake Plateau within the Seven Mile Creek drainage on the Fishlake NF, approximately 170 km (105 air miles) northeast of Brian Head Peak. The population located within the Seven Mile drainage was mapped through one week of field survey work during 1994. Arizona willow has been found in Utah at elevations ranging from 2,550 m to 3,290 m (8,360 to 10,800 feet).

Though the Arizona willow surveys conducted in Utah during 1994 added substantial information to our knowledge on the distribution of the species, additional potential habitat occurs on the Dixie and Fishlake NFs. More surveys are scheduled for 1995. Also, potential habitat may occur in other National Forests in southern Utah, as well as in western Colorado and northern New Mexico. In Arizona the appropriate high elevation wet meadow or stream side habitats required by Arizona willow are very limited outside of the White Mountains. Other potential sites for Arizona willow in Arizona would include the inner basin of the San Francisco Peaks in the vicinity of Flagstaff, on the Coconino National Forest.

IV. HABITAT AND ECOLOGY

Arizona willow requires a specific habitat of limited occurrence. Arizona willow habitat usually occurs as a narrow linear strip, in unshaded or partially shaded wet meadows, along streamsides, in cienegas, and typically in or adjacent to perennial water. It often occurs in saturated soils but attains its greatest stature on soils which are moist but not entirely saturated (Granfelt 1989a, Subirge 1993, Medina *in litt.* 1993). Less commonly, plants are found at seeps and springs, in meadows adjacent to forest edges or in meadows with sparse stands of spruce. Plants are also found in drier sites within the riparian zone (Galeano-Popp 1988, Granfelt 1989a). In these drier sites, there is some evidence that subsurface stream channels exist, suggesting that plants had established along flowing streams (Galeano-Popp 1988, Granfelt 1989a, Subirge 1993). All but one Arizona willow site occurs on basaltic (volcanic) soils. In Utah, there is one population found on soils derived from Wasatch limestone (Rodriguez *et al.* 1995). Arizona willow can be found in extremely rocky situations, though this is considered uncommon (Galeano-Popp

1988). Plants have been found occupying all aspects, but they primarily trend east, north, or south, on sites with less than nine percent slope (Rodriguez *et al.* 1995). The habitat requirements for germination and seedling establishment may be different than that required by juvenile or established plants. Preliminary data by Subirge (1993) and Nelson (pers. comm. 1994) suggest that the occurrence of Arizona willow is, in part, determined by a relationship between soil moisture, texture, and aeration.

The factors responsible for the variations in growth habit of Arizona willow are not completely understood. Taller plants tend to occur in relatively protected sites, such as within the crowns of other woody vegetation (Galeano-Popp 1988, Medina *in litt.* 1989), are rooted in oxygenated sediments of fine gravels and coarse sand (Medina *in litt.* 1993), and the water table does not extend over the surface of the soil and may be as deep as 0.5-1.0 m (to 3 feet) within the soil (Subirge 1993). Prostrate forms, either as mats or single stemmed plants, may be an adaptive response to environmental factors and are often associated with high elevation cienegas where there is deep winter snowpack (Fletcher in Galeano-Popp 1988), late spring freezes (Medina *in litt.* 1989), and water saturated soils where subsurface anaerobic conditions may be very close to the surface (Medina *in litt.* 1993, Subirge 1993). Physical factors such as browsing may also influence plant stature and growth form (Galeano-Popp 1988).

Arizona willow blooms in early spring with male and female catkins produced on separate plants. The timing of budding, flower emergence, and leaf growth is dependant on the elevation and local climatic factors. Arizona willow may flower in late May to early July, with fruit maturing June through August, as the leaves reach full development. The seeds are extremely light-weight and are disseminated by wind and water. The time period in which Arizona willow seeds are capable of germinating may be quite brief (Medina *in litt.* 1992), but the seeds of Arizona willow have been found to germinate readily when provided ample moisture and light (Maschinski pers. comm. 1993). Galeano-Popp (1988) observed plants as short as 30 cm (12 inches) which produced some catkins. Arizona willow also reproduces vegetatively, which can confound enumeration of individuals. Distinguishing the stems of one clone from the stems of another clone can be difficult or impossible (Galeano-Popp 1988).

Arizona willow is known to introgress with other associated species. According to Dorn (pers. comm. 1994), willow (*Salix*) introgression and hybridization occurs among various species throughout North America, but is not a significant issue in determining willow taxonomy. The variation due to environmental gradients has a greater influence on morphologic variation within and among taxa (Atwood pers. comm. 1995).

Introgressed forms have been observed in Utah that occur with Arizona willow and *S. brachycarpa* at the CCC Camp population, with *S. boothii* at the Seven Mile population, and apparently with *S. wolfii* at Seven Mile on the Fishlake NF. These introgressed forms are few in comparison to total population numbers (Atwood pers. comm. 1995). Introgressed forms express a mix of morphologic features from both parents, but appear to be sterile since no viable seeds were produced, based on observations made in 1994 (Atwood pers. comm. 1995). In Arizona, if introgression occurs it probably would be between Arizona willow and *S. boothii* or *S. monticola*. A few individuals willow plants have been noted by Granfelt (*in litt.* 1995a) which have been difficult to identify morphologically.

In Arizona, Arizona willow densities are extremely variable. Within the riparian corridor, Arizona willow plants may be clustered, individuals may occur singly or be widely spaced (more than 2 km or 1 mile apart) (Galeano-Popp 1988), may form open linear stands along streams for reaches up to 2 km (1 mile) in length (Granfelt *in litt.* 1992), or may be the dominant shrub in large, dense patches, occupying more than 100 hectares (ha) (up to several hundred acres) (Rodriguez *et al.* 1995). The presence and quantification of Arizona willow is often concealed by dense grasses and sedges (Granfelt 1989a).

Galeano-Popp (1988) recorded 15 populations of Arizona willow on the Apache-Sitgreaves NFs. Of these populations, eleven had extremely low densities, and nine of these had fewer than five plants per 1 km (0.6 mile) of stream reach. Approximately 50 percent of all known plants on the Forest are within a 3.2 km (2 mile) reach of the West Fork of the Little Colorado River in the Mount Baldy Wilderness Area, and approximately 40 percent of all Forest plants are within a 4 km (2.5 mile) reach of the East Fork of the Little Colorado River, from upstream of the Phelps Cabin Botanical Area to Colter Reservoir. Subsequent to Galeano-Popp's 1988 surveys, additional plants have been located on the Forest within known populations and one or two new

sites have been found, each with very low plant densities (Subirge pers. comm. 1992, and Medina *in litt.* 1989).

Granfelt documented at least 26 distinct sites with Arizona willow on the Reservation (Granfelt 1989a, *in litt.* 1995a). Populations at Smith, Skeeter and Purcell Cienegas may each exceed 1,000 individuals, though most of the plants at Smith and Purcell Cienegas are prostrate, non-flowering, single-stemmed forms. The most vigorous populations on the Reservation are reported from Reservation Creek and Skeeter Cienega, each with plants exceeding 0.75 m (2 feet) in height and with both male and female plants producing catkins. Several other populations on the Reservation have many individuals. Eight sites on the Reservation are considered to be low density, with less than 30 plants each (Granfelt *in litt.* 1991).

Galeano-Popp (pers. comm. 1991) and Granfelt (1989a and *in litt.* 1992) believe that all major habitat sites in the White Mountain region of Arizona have been surveyed and that no significant populations of Arizona willow remain to be found there. Additional surveys may locate isolated plants that were not located during previous surveys. As habitat conditions improve through improved management efforts, additional surveys should be initiated to locate individuals and populations that may have surfaced through release of grazing induced stress (Atwood pers. comm. 1995). The majority of all known Arizona willow plants and approximately 80 percent of all currently occupied Arizona willow habitat in Arizona are on the Reservation.

Although there are no historic records documenting the former distribution of Arizona willow, Galeano-Popp (1988) and Granfelt (1989a) both determined, based upon known occurrences of Arizona willow, its scattered distribution, and the assessment of appropriate habitat, that unoccupied habitat within the known range does exist. Galeano-Popp (1988) also speculated that Arizona willow may have occurred historically in the Burro Creek, Big Lake, and Crescent Lake areas, and possibly in the upper portion of Hayground Creek.

Eighteen Arizona willow sites occur on the Markagunt Plateau, on and adjacent to the Dixie NF in Utah. These occur in high elevation wetland habitats generally similar to those in Arizona. Various growth forms are manifest based on soils, moisture, and herbivore impacts. However, in coarse, well drained soils on the Markagunt Plateau, individual plants are often robust shrubs

1.3 m (4 feet) tall, forming large, dense patches, sometimes occupying more than 100 ha (several hundred acres). In many areas, Arizona willow is often the dominant shrub component. Eleven populations are estimated to include from thousands to tens-of-thousands of plants each. The other nine populations on the Markagunt Plateau have less than 200 plants each. Individuals are seldom found to be widely spaced throughout a drainage. The largest populations, Rainbow Meadows, Lowder Creek, and Powerline, occupy 123 ha (304 acres), 57 ha (142 acres), and 42 ha (105 acres), respectively. These three populations dominate their respective willow communities. There are approximately 354 ha (874 acres) of occupied Arizona willow habitat on the Markagunt Plateau, of which 85 ha (210 acres) occur on private land (Rodriguez *et al.* 1995).

One population with a single site is known from the Paunsagunt Plateau along the East Fork of the Sevier River. This population contains 14 individuals.

On the Fishlake NF, the known range of Arizona willow is limited to the Seven Mile Creek drainage as based on surveys conducted in 1994. This population has been surveyed for approximately four miles along the stream and adjacent meadows and riparian stringers, and occupies 61 ha (151 acres). Arizona willow has been located within the entire length of the area surveyed in elevations ranging from 2,800 m to 2,865 m (9,200 to 9,400 feet). Plants were most commonly located adjacent to perennial streams, but were also associated with numerous springs and seeps. It was not uncommon to find Arizona willow adjacent to forested edges. Some plants were located in drier upland sites along forested edges. Arizona willow tends to occur in large, dense patches, sometimes occupying up to 12 ha (30 acres) in size. Individuals were generally clustered, but occasionally occurred as single individuals spaced throughout a drainage mixed with various other willow species (Rodriguez *et al.* 1995).

Transplant efforts for Arizona willow were undertaken by the Apache-Sitgreaves NFs to assess the feasibility of propagating Arizona willow cuttings in a nursery for the purpose of producing containerized plants for reintroduction to potential sites. Arizona willow cuttings were collected, grown for two years, and three-hundred plants were transplanted near Merlin Reservoir and on the east side of Burro Mountain. Within several years, all but a few individuals from these

plantings have died, attributed primarily to elk browsing and extremely dry conditions. However, these efforts have helped provide insight into the assessment of appropriate habitat.

Arizona willow is part of a high elevation riparian community which occurs along streambanks and in wet meadows within the subalpine conifer forests of Engelmann spruce (*Picea engelmannii*), blue spruce (*Picea pungens*), Douglas-fir (*Pseudotsuga menziesii*), white fir (*Abies concolor*), subalpine fir/corkbark fir (*Abies lasiocarpa*) and quaking aspen (*Populus tremuloides*). In Arizona, Arizona willow grows in riparian communities which may include any of several other willow species, such as: serviceberry willow (*Salix monticola*), Geyer willow (*S. geyeriana*), Bebb willow (*S. bebbiana*), plainleaf willow (*S. planifolia*), and occasionally Booth's willow (*S. boothii*) and blue-stem willow (*S. irrorata*). Some of the plant species also associated with Arizona willow in Arizona include: shrubby cinquefoil (*Potentilla fruticosa*), varileaf cinquefoil (*Potentilla diversifolia*), monkeyflower (*Mimulus primuloides* and *M. guttatus*), trumpet gooseberry (*Ribes leptanthum*), buttercups (*Ranunculus aquatilis*, *R. macounii*, and *R. cymbalaria*), wild onions (*Allium geyeri*, *A. rubrum*, and *A. macropetalum*), violet (*Viola adunca*), marsh marigold (*Caltha leptosepala*), bitter cress (*Cardamine cordifolia*), shooting star (*Dodecatheon alpinum*), willow weed (*Epilobium* spp.), Bigelow groundsel (*Senecio bigelovii*), tufted hairgrass (*Deschampsia caespitosa*), meadow barley (*Hordeum brachyantherum*), alpine Timothy (*Phleum alpinum*), fescues (*Festuca* spp.), sedges (*Carex* spp.), rushes (*Juncus* spp.), and moss (*Aulacomnium palustre* and *Climacium dendroides*) (Galeano-Popp 1988, Subirge 1993, Granfelt *in litt.* 1995a). Throughout much of Arizona willow habitat on the Apache-Sitgreaves NFs, the nonnative grass species Kentucky bluegrass (*Poa pratensis*) forms dense sod within the riparian corridor (Subirge 1993). On the Reservation, dense Kentucky bluegrass sod is typically located at elevations lower than is normal for Arizona willow (Granfelt *in litt.* 1995a).

In southern Utah, the riparian communities with Arizona willow include some plant species not found in Arizona, but it also includes various species of willows such as barren-ground willow (*Salix brachycarpa*), coyote willow (*S. exigua*), Geyer willow (*S. geyeriana*), Wolf willow (*S. wolffi*), Booth's willow (*S. boothii*), and plainleaf willow (*S. planifolia*). Other species associated with Arizona willow in Utah include western yarrow (*Achillea millefolium*), American

bistort (*Polygonum bistortoides*), mountain deathcamas (*Zigadenus elegans*), elkslip marshmarigold (*Caltha leptosepala*), elephant lousewort (*Pedicularis groenlandica*), largeleaf avens (*Geum macrophyllum*), meadow barley (*Hordeum brachyantherum*), alpine timothy (*Phleum alpinum*), common dandelion (*Taraxacum officinale*), smallwing sedge (*Carex microptera*), beaked sedge (*Carex rostrata*), water sedge (*Carex aquatilis*), Nebraska sedge (*Carex nebraskensis*), golden sedge (*Carex aurea*), small-leaf angelica (*Angelica pinnata*), Kentucky bluegrass (*Poa pratensis*), Columbia monkshood (*Acontium columbianum*), wanderer violet (*Viola nephrophylla*), shrubby cinquefoil (*Potentilla fruticosa*), varileaf cinquefoil (*P. diversifolia*), tall larkspur (*Delphinium occidentale*), tufted hair-grass (*Deschampsia caespitosa*), western wheatgrass (*Agropyron smithii*), and Baltic rush (*Juncus balticus*) (Mead and Rodriguez 1994).

The high elevation riparian ecosystem upon which Arizona willow depends is fragile and also provides habitat for other rare species of plants and animals. In Arizona such species as Mogollon paintbrush (*Castilleja mogollonica*), Gila groundsel (*Senecio quaerens*), Mogollon clover (*Trifolium longipes* var. *neurophyllum*), Goodding onion (*Allium gooddingii*), New Mexico jumping mouse (*Zapus hudsonius luteus*), and the threatened Apache trout (*Oncorhynchus apache*) occur in the same ecosystem as Arizona willow. In Utah, rare species such as paradox bloodmoonwort (*Botrycium paradoxum*), Navajo Lake milkvetch (*Astragalus limnocharis* var. *limnocharis*), boreal toad (*Bufo boreas*) and willow flycatcher (*Empidonax traillii*) are found within Arizona willow ecosystems.

These habitats have been subjected to numerous uses for more than a century which have degraded habitat conditions, brought about changes in local riparian community species composition, and have altered the natural hydrological characteristics of many stream systems. The rarity and scattered distribution of Arizona willow indicate the species may have once been more common. In addition, the limited evidence of successful Arizona willow seedling establishment, the presence of a possibly virulent pathogen, and the comparison of Arizona and Utah populations, suggest many of the natural functions of these high elevation riparian ecosystems have been disrupted.

Studies on the distribution, biology, autecology, habitat, and ecology of Arizona willow continues, with several investigations in progress in Arizona (Medina 1991, Subirge 1993) and in Utah (Mead and Harper 1994, Taylor and Harper 1994, Rodriguez 1994, Van Buren and Harper 1995). McArthur (1995) is currently completing chemical analysis of Arizona willow populations from Arizona and Utah using thin layer chromatography.

V. THREATS, LAND USE, AND HABITAT MODIFICATION

The ecological processes which effect Arizona willow and its habitat are very complex and interconnected, involving not only the riparian zone but the entire watershed. These natural processes are poorly understood, as are the specific ecological factors which have restricted successful Arizona willow propagation and consequently have contributed to habitat degradation for this species. All Arizona willow habitat in Arizona may be considered as degraded today in comparison to what once existed (Granfelt *in litt.* 1992).

Populations of Arizona willow may be limited by a variety of factors. Habitat fragmentation in Arizona has resulted in small, isolated populations, often with so few plants remaining (even as low as one) that the populations may no longer be viable and are easily impacted by any natural or man caused action (Granfelt *in litt.* 1991). Sexual reproduction within small populations depends on the relative proportion of male and female plants and their proximity to plants of the opposite sex. In addition, competition with other less palatable species of willow and exotic species (e.g., *Poa pratensis*) may have contributed to the decline of Arizona-willow populations (Medina *in litt.* 1989).

Populations in Utah are often dominated by Arizona willow in association with plainleaf willow. Plants are often robust uniform stands, 1.3 m (4 feet) tall forming large, dense patches. Of all Arizona willow populations known, the populations on the Markagunt Plateau are the largest, most dense stands known. These populations are primarily in mid to late seral stages but represent healthy vigorous stands that produce large amounts of flowers and fruit. Granfelt (pers. comm. 1994) called these Utah populations the "mother lode."

A. Disruption of Hydrologic Processes

The stream hydrology and sediment transport characteristics of these high elevation systems have many ramifications to Arizona willow. Cattle, elk, rodents, and human recreational use each contribute to bank instability. Bank collapse due to cattle movements and concentrated use in riparian areas was reported by Galeano-Popp (1988) and Rodriguez (1994) as common and widespread within Arizona willow habitat on Forest lands. Medina (*in litt.* 1989) reported that in Arizona, elk (*Cervus elaphus*) may also effect bank stability, and that tunneling by rodents weakens stream bank integrity, especially due to the prevalence of shallow rooted Kentucky bluegrass rather than the more deeply rooted native riparian species. Elk in Utah, however, are of relatively lower densities and are not known to have contributed to stream bank instability.

Erosion and siltation may adversely affect Arizona willow through the accumulation of fine textured deposits and its effect on soil aeration characteristics and depth of the water table. Dense mats of Kentucky bluegrass and sedges act as a filter within the riparian zone, both trapping sediments and increasing flow resistance which allows deposition of fine materials to occur (Subirge 1993). The decay of the fine textured root mass of Kentucky bluegrass and sedges further contributes fine organic sediments to the stream system (Subirge 1993). These conditions may also effect the meander pattern of the stream (Subirge 1993). In many areas of Arizona willow habitat on the Apache-Sitgreaves NFs, 30-45 cm (12-18 inches) of silt sediments has accumulated, heavily loaded with organic deposits. These sediments include particulates dislodged by grazing ungulates and from decaying vegetation. The fine sediments impair the vertical diffusion of gasses within the soil profile and provide substrate for bacteria which further contribute to anaerobic conditions (Subirge 1993). These sediment deposits alter habitat conditions for Arizona willow and may contribute to low recruitment and reduced plant vigor. Galeano-Popp (1988) observed vigorous seedlings on the Apache-Sitgreaves NFs on only a few occasions. Working in Arizona on the Apache-Sitgreaves NFs and Reservation, Medina (*in litt.* 1993) reported seedlings were rarely encountered and that Arizona willow population age structure appeared heavily skewed toward older, non-healthy plants.

Few seedlings were encountered in Utah; however, these populations consisted of healthy vigorous stands that produced large amounts of flowers and fruits. Within the Crystal Springs,

East Powerline, Hancock Peak, Lowder Creek, Midway Face, Powerline, and Rainbow Meadows populations, virtually all potential habitat appears to be occupied by Arizona willow and other willow species.

The Cedar Breaks National Monument portion of the CCC Camp population consists of healthy, vigorous, low growing plants in comparison to those on adjacent Dixie NF. A distinct fence line contrasts demonstrates impacts from excessive livestock use on the Forest (Rodriguez *et al.* 1995).

The Apache-Sitgreaves NFs has been working to address the problem of sedimentation from roadways near riparian crossings. These roads have been sprayed with oils or a surface sealant to bind soil particles together to prevent sediments from entering the stream system.

The construction of high elevation lakes, reservoirs, and ponds has resulted in the permanent loss of Arizona willow populations and habitat in Arizona. These impoundments were constructed for recreational fishing, and/or livestock and wildlife waters. In Arizona, the presence of Arizona willow along Reservation Creek both above and below Reservation Lake and its minor tributaries provide convincing evidence that Reservation Cienega, prior to inundation and creation of Reservation Lake, supported an Arizona willow population. Similar evidence of inundated Arizona willow populations is found above and below Hurricane Lake, Colter Reservoir and Lee Valley Reservoir. The construction of Sunrise Lake, White Mountain Reservoir, and several minor impoundments, inundated Arizona willow habitat (Galeano-Popp 1988, Granfelt 1989a and *in litt.* 1991). However, these impoundments were constructed before the description of Arizona willow as a new species or prior to the knowledge of the limited distribution of this species. Though these dams were constructed years ago, they continue to effect stream hydrology and alter the natural flood regime. Organic residues accumulate within and below reservoirs where stream flow energy is now insufficient to flush out deposits. The stream below Lee Valley Reservoir is silting in and not maintaining a defined channel with its associated stream-side habitats (Subirge 1993).

The presence of these reservoirs may also contribute to increased wildlife use within Arizona willow habitats (Galeano-Popp 1988). Arizona willow populations occur at sites which may be

considered as prime locations for construction of future reservoirs. However, neither the Apache-Sitgreaves NFs, White Mountain Apache Tribe (Tribe), nor Arizona Game and Fish Department (AGFD) has indicated there are any plans for new reservoirs in the Mount Baldy area of Arizona. In Utah, there are no plans for new reservoirs in the Brian Head, East Fork of the Sevier River, or Seven Mile Creek areas.

On the Reservation, a water diversion ditch and pipeline were constructed in the late 1970s to transfer water from Becker Creek, across a tributary of Snake Creek, to Sunrise Lake to maintain water levels and improve water quality in the lake. This diversion was considered to have affected the flow regime of the tributary to Snake Creek where a population of Arizona willow occurs (Fairweather 1993). However, near normal stream flows appear to occur within this intermittent drainage following snow melt and summer thunder showers (Granfelt *in litt.* 1995b). The robust Arizona willow population along this stream was infected by a rust pathogen in 1988 and severely impacted (Granfelt 1989a). The factor(s) that caused Arizona willow mortality within this stand following the rust infestation has not been established.

B. Livestock and Wildlife

Arizona willow is exposed to herbivory from numerous species of vertebrate and invertebrate animals, including cattle (Galeano-Popp 1988, Granfelt 1989a), elk (Galeano-Popp 1988, Granfelt 1989a, Medina *in litt.* 1989), deer (Rodriguez *et al.* 1995), voles (Medina *in litt.* 1989), beetles (Medina *in litt.* 1993), and the caterpillars of butterflies (Subirge pers. comm. 1992, Fairweather 1993). Herbivory results in the loss of plant material which may reduce plant vigor and reproductive success, decrease plant height, and affect plant growth habit.

Historic livestock grazing in high elevation riparian communities has been extensive and has caused major impacts contributing to Arizona willow habitat degradation. Heavy stocking rates were present throughout the East Fork of the Sevier River and Seven Mile areas from about 1870 to present day (Atwood and Rodriguez 1994). Livestock use was especially high in the Mount Baldy vicinity of the White Mountains during the 1910-1940 period (Granfelt *in litt.* 1992). Livestock grazing has brought about many impacts, including changes in species composition especially to the riparian vegetation community, but also to the upland vegetative

communities. The introduction of nonnative species, and the alteration of stream hydrology has had a significant impact in the degradation of riparian plant communities.

Livestock grazing in Arizona willow habitat continues to present day. On the Apache-Sitgreaves NFs, most Arizona willow habitat is included within five grazing allotments. On the Reservation, little cattle grazing has occurred during the past twenty to thirty years in the high elevation areas of Mount Baldy (Granfelt *in litt.* 1992). However, there are several active livestock grazing areas on the Reservation within Arizona willow habitat, including the general vicinity of Reservation Lake and a tributary of Snake Creek. Within the areas on the Reservation where there has been little recent livestock use, the plant communities have been developing without the impact of domestic livestock. The existing Arizona willow populations are being maintained, but it is not evident that the habitat has improved for its expansion. The specific requirements for such expansion are not known (Granfelt *in litt.* 1992).

In Utah, Arizona willow habitat is included in eight grazing allotments. On the Dixie NF, four of seven allotments are permitted for sheep grazing. The remaining 4 allotments, three on the Dixie NF and one on the Fishlake NF, are permitted to cattle. Historical sheep use on the Dixie NF was once more extensive than current permitted numbers. Sheep use on the Dixie NF has primarily been observed in the uplands, above the riparian areas. Therefore, sheep grazing has not been identified as a primary concern to the viability of Arizona willow populations in Utah. Within some Arizona willow populations, livestock have contributed to habitat degradation, to a reduction in the health and vigor of Arizona willow, and probably to the loss of individual plants and/or clones (Rodriguez *et al.* 1995). However, most Arizona willow populations are healthy, vigorous stands that produce large amounts of flowers and fruits. The Cedar Mountain population located on the Cedar City Ranger District, Dixie NF, contains healthy viable populations. The East Fork of the Sevier River population's viability is questionable due to the lack of reproducing individuals, very low population number (14 individuals), and significant habitat loss as a result of hydrologic changes and livestock grazing. The CCC Camp populations occurs along the eastern boundary of Cedar Breaks National Monument with Dixie NF. The boundary fence provides an artificial L-shaped enclosure which the local sheepherder on the Forest uses as a holding-bedding ground. Over the years this has had a significant impact on the vegetation in the area. A distinct fence line contrast exists between the Monument and

the Forest. Arizona willow plants on the Monument are very healthy, dense stands, in contrast to the few plants and poor condition on the Forest portion. Populations within the Seven Mile drainage appear to be viable; however, overall Arizona willow stand and ecosystem health is low, evidenced by poor plant vigor and very little annual leader growth or catkin development.

Neither the riparian nor the upland communities in the Seven Mile drainage are in, or are progressing toward, the desired condition. The allotment management plan developed in 1986 was not fully implemented, and the Seven Mile Creek watershed remains in degraded condition.

In Arizona, the most pervasive effect of past and current livestock use in Arizona willow habitat on the Apache-Sitgreaves NFs is the persistence and dominance of the nonnative Kentucky bluegrass along streambanks and in wet meadows. This grass often forms a dense, shallow rooted sod in riparian areas, particularly when exposed to heavy grazing pressure (Subirge 1993). The presence of Kentucky bluegrass directly affects Arizona willow by the rapid colonization of exposed soils and the formation of thick sod. Kentucky bluegrass prevents Arizona willow seeds from reaching bare soils and germinating, and decreases the nutrients available for establishment of Arizona willow plants (Subirge 1993). In Utah, Kentucky blue grass is a minor component of riparian vegetation in Arizona willow habitat and does not appear to be a significant factor affecting Arizona willow seedling establishment.

Arizona willow is palatable to cattle and elk, and is readily consumed by both species (Galeano-Popp 1988, Medina *in litt.* 1989). Whether cattle or elk preferentially select Arizona willow (Galeano-Popp 1988) or consume it incidental to the grazing of adjacent vegetation (Medina *in litt.* 1993) is uncertain, as is the proportion of the total use on Arizona willow to be attributed to either herbivore species. However, the effects of grazing on Arizona willow, by whatever species, are additive. In Arizona, taller Arizona willow plants typically occur in relatively protected sites, such as within the shelter of larger willows species (Galeano-Popp 1988, Medina *in litt.* 1989) or at exposed rocks along streams where access by herbivores is restricted (Fairweather 1993).

To examine the effects of livestock grazing on Arizona willow on the Apache-Sitgreaves NFs, Galeano-Popp (1988) compared the heights of plants occurring within and outside the livestock grazing enclosure around the Phelps Botanical Area. The tallest Arizona willow plants on the

Forest known at that time were within the enclosure, where the weighted mean plant height was 25 cm (10 inches) taller than immediately outside the enclosure. Further comparisons by Galeano-Popp (1988) found significantly lower plant densities in the livestock grazed sites versus the ungrazed sites. The prevalence of low density sites on the Forest, in contrast to Reservation populations where livestock grazing is limited, provides additional evidence that livestock grazing has contributed to a reduction in plant density and distribution on the Forest (Galeano-Popp 1988).

Galeano-Popp (1988) reported that two Arizona willow sites on the Apache-Sitgreaves NFs were under immediate threat of loss due to over-utilization, primarily by livestock. Granfelt (1989a) reported that one population on the Reservation was in jeopardy due to elk and livestock grazing pressures. Grazing impacts may be responsible, in part, for the prevalence of short stature, non-flowering plants throughout the range of Arizona willow (Galeano-Popp 1988).

Livestock and elk can physically damage Arizona willow by trampling plants. Hoof action can break stems, especially of low growing forms, and sever roots causing die back (Medina *in litt.* 1993). No data are available to quantify the degree of physical damage by elk and livestock to Arizona willow.

Populations of Arizona willow in Utah show selective grazing, primarily by cattle. In Lowder Creek, it was evident that selected Arizona willow plants were grazed by cattle and showed heavy use in comparison to other plants in the area that were ungrazed. Within the Sheep Herder site, selected plants were grazed by domestic sheep and possibly by a horse that was hobbled in the area by the permittee.

The Arizona willow population at the East Fork of the Sevier may have been impacted by historical cattle grazing. This population consists of 14 robust plants; however, catkin and seed production was observed to be limited in 1994. No seedling recruitment was observed within this riparian community (Rodriguez *et al.* 1995). Potential habitat was surveyed above this population with negative results. This population is the only known population found on sedimentary soils; all other populations in Utah and Arizona occur on volcanic soils. Due to the uniqueness of this population, a detailed soils analysis, and chemical analysis of the species

(chromatography), has been initiated as a part of a Brigham Young University (BYU) graduate research program and FS Intermountain Research Station investigations. Recognizing the importance of this population, 10 of the 14 plants have been fenced with a 3-way experimental exclosure.

Elk are generalists herbivores, feeding on grasses and shrubs (Murie 1951, Boyce 1989). Elk utilize willows at all seasons of the year, favoring the youngest shoots (Murie 1951, Despain 1989). Elk use of Arizona willow is evident on both the Apache-Sitgreaves NFs and Reservation (Granfelt 1989a, Medina *in litt.* 1989). Elk numbers have been reduced on the Apache-Sitgreaves NFs over the last several years in order to meet established population herd objectives as stated in the approved AGFD elk management plan (see Part IV, D). Granfelt (1989a) found that Arizona willow utilization by elk was common at almost all sites on the Reservation. The impact of elk use on Arizona willow is reflected in lower plant stature and a hedged appearance. On the Reservation, Arizona willow plants have been closely browsed along Ord Creek at Smith Cienega, an elk concentration area. The direct effects of grazing on Arizona willow are present throughout the range of the species but are manifest to a much greater degree in areas where both elk and livestock are present (Galeano-Popp 1988).

Elk numbers on the Dixie and Fishlake NFs are significantly lower than those found in the White Mountains of Arizona. Elk numbers are in stable condition, all of which are within established population herd objectives, as stated in approved elk management plans. Field data from Utah indicate that elk use on Arizona willow plants is negligible. Preliminary data collected by research graduate students, and field observations by agency personnel indicated that little wildlife grazing occurs on Arizona willow (Rodriguez *et al.* 1995). To quantify this, four three-way experimental exclosures have been established to collect baseline data of ungulate use on Arizona willow and associated species. These have been established on Lowder Creek, Sheep Herder, and East Fork of the Sevier sites on the Dixie NF and will be in place on Seven Mile Creek on the Fishlake NF in summer 1995 (Taylor and Harper 1994).

Deer numbers are down throughout the State of Utah and observations of use on willow has not been documented. Deer observations in the East Fork of the Sevier population has not been recorded; however, this population of deer is slightly higher than other populations in Utah

within Arizona willow habitat. Herbivory from deer is likely occurring; however, not on a measurable level.

Moose (*Alces alces*) occur within the Seven Mile drainage on the Fishlake NF. Direct effects of grazing on Arizona willow is unknown; however, no noticeable use was observed during field observations in 1994. Monitoring will be an ongoing activity within this area.

Pronghorn (*Antilocapra americana*) and mule deer are often found in the high elevation meadows and forest edges in the Mount Baldy vicinity, Arizona. However, any potential impact to Arizona willow is considered negligible due to low numbers. Although pronghorn occur within the East Fork of the Sevier area, Utah, they have not been observed within potential Arizona willow habitat. Observations of antelope have been made approximately 18 miles down the drainage (north).

Herbivory by rodents, especially voles (*Microtus* spp.), was reported by Medina (*in litt.* 1993) in Arizona as a source of predation in many Arizona willow stands, primarily affecting prostrate plants. These rodents ate roots and basal plant parts resulting in the loss or girdling of stems. Also, roots were often clipped in the construction of tunnel networks (Medina *in litt.* 1989). Rodent activity affecting Arizona willow was primarily in the wet meadows and occurred during the winter (Medina *in litt.* 1992).

Beaver (*Castor canadensis*) will always be a potential threat to most Arizona willow populations (Granfelt *in litt.* 1991). Beaver dam construction results in flooding of riparian areas. It also affects stream hydrology by creating new channels, streambenches, and deposition areas (Galeano-Popp 1988). Beaver activities, including site abandonment, can effect the local distribution of Arizona willow in several ways (Galeano-Popp 1988). Flooding can inundate and kill willow plants but may also contribute to the development of potential habitat for Arizona willow propagation (Granfelt *in litt.* 1992) and the expansion of habitat along the periphery of ponds (Galeano-Popp 1988). Abandonment of ponds again alters the hydrology of the site, causing local soil drainage and lowering of the water table.

Beaver activity has been recorded at numerous sites in Arizona willow habitat on both the Apache-Sitgreaves NFs and Reservation (Granfelt 1989a and *in litt.* 1992). At Skeeter Cienega along Ord Creek on the Reservation, Arizona willow are found adjacent to the creek but also up to 30 m (100 feet) away, topographically much higher than usual. This may be the result of past beaver activities which have altered the drainage patterns in the cienega (Granfelt 1989a). In general, the larger and more vigorous the riparian community, the less severe the impacts on Arizona willow from beaver (Galeano-Popp 1988). Beaver may be an important component in the natural dynamics of these riparian systems.

In Utah, beaver activity has been observed on two of the 19 populations of Arizona willow on the Dixie NF, in the upper portion of the Rainbow Meadows and East Fork of the Sevier River. Herbivory threats from beaver are not a significant impact on Arizona willow for three primary reasons: 1) sufficient amounts of aspen occur adjacent to Arizona willow populations on both the Dixie and Fishlake NFs; 2) aspen is the preferred food by beaver and Arizona willow would not receive much, if any use until aspen stands are depleted; and 3) very few beaver currently exist in the drainage where known Arizona willow populations occur. Although dam construction could result in flooding of riparian areas reducing potential habitat for Arizona willow, observations made in Utah during 1994 indicate this is not a problem. Beaver activity in upper Rainbow Meadows has resulted in a net gain of Arizona willow habitat by holding water on steeper side slopes where seep/spring water that normally would run down slope was held in place, creating better habitat for the willow. These areas currently have very healthy, robust populations of Arizona willow. In the East Fork of the Sevier population, beaver dams would probably increase potential habitat for Arizona willow and allow for expansion of this population by helping to raise the water table.

Arizona willow herbivory by insects include caterpillars of the mourning cloak butterfly (*Nymphalys antiopa*), beetles (Coleoptera) and grasshoppers (Orthoptera) (Fairweather 1993, Medina *in litt.* 1993). Insects tend to occur most often on leaves of younger stems. Caterpillars have been observed at many Arizona willow sites, generally causing a light defoliation. In a few cases, defoliation by caterpillars was heavy enough to cause branch dieback (Subirge pers. comm. 1992, Fairweather 1993). Insect herbivory appears to have a localized affect on Arizona willow.

Impacts by insects to Arizona willow populations in Utah are poorly understood. However, insect galls were observed in Rainbow Meadows and Lowder Creek on the Dixie NF.

C. Disease

In Arizona, a fungal disease infecting Arizona willow has been tentatively identified as the rust *Melampsora epitea* (Fairweather 1993). Rust species have a very complex life cycle, with multiple spore stages and often with alternate host species (Fairweather 1993). Some rusts have alternate host species in the gooseberry family (genus *Ribes*), but the alternate host for this rust remains unknown. Rust infections have been observed at a minimum of eleven sites; seven on the Reservation, four on the Forest (Granfelt *in litt.* 1995b).

Heavily infected plants have been found at three of the six infected sites (Fairweather 1993). *Melampsora* typically causes premature leafdrop, loss of plant vigor, and a reduction of stored carbohydrates which delays regrowth the following spring. Heavy rust infestations have caused stems to dieback and have delayed plant shoots entering dormancy making them susceptible to frost damage. Flower and seed production by infected Arizona willow is practically non-existent (Fairweather 1993).

Granfelt (in Galeano-Popp 1988) reported Arizona willow being defoliated along a 1 km (0.6 mile) stream reach on the Reservation, regardless of pre-infection plant size or apparent vigor. The damage from rust is evident in the persistent dead stems of previously large plants, with new shoots producing the majority of leaf growth. Though heavily infected Arizona willow have re-sprouted in following years, some plants have died (Granfelt 1990). The once vigorous and healthy Arizona willow population studied by Granfelt has experienced 20 percent mortality in the five years since the rust infestation began (Granfelt *in litt.* 1992). Mortality of Arizona willow plants may be a direct cause of the rust, or the rust infestation may have made the plants more susceptible to a secondary pathogen or an environmental stress, such as freezing, browsing, reduced stream flows through diversions, or siltation (Fairweather 1993).

Resistance to the rust varies among individual Arizona willow plants. Apparently healthy, uninfected plants are adjacent to heavily infected plants (Galeano-Popp 1988). The ability to

resist rust infections is genetically controlled, with infestations very host specific, to the point of being virulent to particular genotypes (Fairweather 1993). To maintain healthy Arizona willow populations within the context of the natural host/disease inter-relationship, a diverse Arizona willow gene pool is critical, with plants both resistant and non-resistant to a particular pathogen variety.

In Utah, no disease has been observed on Arizona willow plants. This could be attributed to the robust, healthy condition of populations on the Markagunt Plateau. Some plants in the Hancock Peak population that overhang the bank near the water surface have shown leaf damage. This is probably due to water damage resulting from high water flow causing rust-like spots on the leaf surface (Atwood pers. comm. 1994). Fairweather (pers. comm. 1994) examined leaves collected from the site and confirmed this damage as a non-rust or other disease. Some frost damage has occurred on some high elevation populations particularly at sites where the tops of plants are exposed to extreme cold during winter months (Atwood pers. comm. 1995).

D. Timber Harvest

Though habitat disturbance from livestock was considered by Galeano-Popp (1988) to have been a major source of siltation in Arizona willow habitat on the Apache-Sitgreaves NFs, there are other factors contributing to Arizona willow habitat degradation. Timber harvesting and its related activities such as skid trails and road construction, may result in excess runoff, increased erosion and sedimentation, and down cutting of stream channels. Most of the upper watersheds in Arizona on the Apache-Sitgreaves NFs containing Arizona willow habitat are within wilderness areas where timber harvest does not occur. However, limited timber harvests on the Forest have occurred in other areas within the range of Arizona willow. On the Reservation, timber harvests have occurred within all watersheds which have Arizona willow (Granfelt *in litt.* 1991). On the Reservation, the effects of streambed down-cutting due to logging done in conjunction with the establishment of ski slopes at Sunrise Ski Resort are evident along portions of Becker Creek (Granfelt *in litt.* 1991). Timber harvest on the Reservation adjacent to many Arizona willow habitat areas has been deferred through the remainder of this decade. There may be harvesting after the year 2000. However, the Tribe's Timber Management Plan states

that a 300-foot (100 yard) stream buffer zone is used where the threatened Apache trout (*Oncorhynchus apache*) occurs. This includes many of the Arizona willow populations.

In Utah, effects from timber harvesting have not been documented. Associated activities such as road and skid-trail construction has created increases of sediment transport into watersheds. Effects on increased waterflow from harvesting are currently being monitored by BYU research graduate students. In an attempt to mitigate the potential increases in overland flow, a 33 meter (100 foot) special management riparian buffer has been established. This buffer is being monitored and evaluated on each timber harvest project.

E. Recreation

Recreational pursuits such as hiking, horseback riding, hunting, and fishing along Arizona willow streams, have an additive impact on Arizona willow habitat. Galeano-Popp (1988) noted that impacts from heavy recreation use on the Apache-Sitgreaves NFs were localized (especially along portions of the West Fork of the Little Colorado River), but these impacts appeared to be significant. When the Forest became aware of some of these impacts in 1980, certain areas were closed to camping, and access to the stream was re-directed. However, streambank condition remains unfavorable for Arizona willow establishment as demonstrated by extremely low Arizona willow densities. Trails within the Mount Baldy Wilderness Area are currently being re-routed out of the riparian area. Stream crossings by trails used by horseback riders continue to cause localized impacts to riparian systems. On the Reservation, most of the high elevation areas around Mount Baldy are closed to non-Tribal members, and access to streams and lakes by fishermen is restricted to designated areas.

On the Reservation, Arizona willow plants have been lost and habitat quality reduced due to construction of the Sunrise Park Resort and associated ski runs, parking lot, roads, snow-making reservoir and pipeline, and other facilities. The former stand of Arizona willow found along tributaries of Becker Creek has now been markedly reduced through habitat modification, degradation, and loss (Granfelt 1989a). Stream channelization, erosion of upland areas, and siltation from roads and road construction has degraded Arizona willow habitat. Individual plants have been buried under debris from the parking area and road construction. Various plans

for expansion of the resort are being considered by the Tribe. Additional development may potentially increase the area and severity of impact to Arizona willow.

Similarly in Utah, it has been noted that on the East Fork of the Sevier population, Dixie NF, off-highway vehicle (OHV) users have impacted potential habitat. In addition, campsites have been long established in the riparian area and were still in use during 1994. These sites have been negatively impacted. In these areas, compacted soils, bank sloughing, and relatively poor plant composition is contributing to habitat degradation (Rodriguez *et al.* 1995).

VI. REVIEW OF SPECIAL STATUS DESIGNATIONS AND PROTECTIONS

Federal government actions on Arizona willow began on December 15, 1980, when FWS published a Notice of Review for Native Plants in the Federal Register (45 FR 82480). That notice included *Salix arizonica* in category 1, which includes those taxa for which the FWS has sufficient information on biological vulnerability and threat(s) to support the appropriateness of proposing to list them as endangered or threatened under the authorities of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act). This designation for Arizona willow was based on its status as a very localized endemic, small population size, and the threat of degradation of riparian habitat by livestock usage (Fletcher 1978).

A status report completed by Phillips *et al.* (1982) in Arizona recommended that Arizona willow be removed from consideration for listing as a threatened or endangered species. Phillips *et al.* (1982) found that Arizona willow had a limited distribution but was locally common, though never the dominant plant species. They reported that all populations appeared healthy with reproduction evident, though many plants were grazed and had a hedged appearance. Based on the recommendation by Phillips *et al.* (1982), the November 23, 1983, Supplement to Review of Plant Taxa for Listing (48 FR 53640), included *Salix arizonica* as a category 3C species. Category 3C includes those taxa that have proven to be more abundant or widespread than previously believed and/or those that are not subject to any identifiable threat. If further research or changes in land use indicate significant decline in any of these taxa, they may be reevaluated for possible inclusion in category 1 or 2.

The September 27, 1985, Federal Register notice (50 FR 39526) of plants under review for threatened or endangered classification, placed Arizona willow in category 2 due to further questions concerning vulnerability and threats to the small populations. Category 2 includes those taxa for which there is some evidence of vulnerability but for which there are not enough data to support a proposed rule for listing.

Arizona willow was again placed in category 1 in the February 21, 1990, revision of the Plant Notice of Review (55 FR 6184). Studies on the Apache-Sitgreaves NFs by Galeano-Popp (1988) provided additional information on vulnerability and threats faced by this species. Granfelt's (1989a) survey on the Reservation concluded that the Reservation population of Arizona willow is diverse and healthy. However, numerous threats to its fragile habitat was recognized (Granfelt 1989a).

A proposed rule to list Arizona willow as an endangered species in Arizona with critical habitat was published in the Federal Register on November 20, 1992 (57 FR 54747). Two public hearings were held regarding this proposal. On March 2, 1993, a public hearing was held in Eagar, Arizona, and on March 3, 1993, a public hearing was held in Whiteriver, Arizona. Notification of the public hearings and reopening of the comment period until April 2, 1993, was published in the Federal Register on February 12, 1993 (58 FR 8249). Newspaper notices of these hearings were published in the Arizona Republic, Phoenix, Arizona, on February 15, 1993, in the White Mountain Independent, St. Johns, Arizona, February 19, 1993, and in the Apache Scout, Whiteriver, Arizona, end of February, 1993. Comments provided as part of the public hearing and open comment period are part of the Arizona willow administrative record (U.S. Fish and Wildlife Service 1995).

On May 31, 1994, the Southwest Center for Biological Diversity filed a Summons and Complaint based on the FWS's failure to meet statutory deadlines to take final action on the proposed rule to list Arizona willow. The FWS, in negotiation with the plaintiffs, reached an agreement to take final action on the proposed rule by April 30, 1995. Based on the reductions of threats and management commitments provided through this Conservation Agreement and Strategy, the FWS has determined that listing is no longer warranted and published a withdrawal of the proposed rule in the Federal Register on April 28, 1995 (60 FR 20951) (Appendix G).

Arizona willow is protected by the Arizona Native Plant Law (Arizona Revised Statutes chapter 7, title 3, article 1) as a Highly Safeguarded Species. This law prohibits the collection of this species unless a permit for educational or scientific purposes is granted by the Arizona Department of Agriculture. However, overuse from collecting is not presently considered a threat to Arizona willow and these permit requirements do not protect populations from habitat degradation or loss. This State law does not apply to Tribal lands.

Several Federal laws, executive orders, and policies indirectly provide varying degrees of protection for Arizona willow habitat. The National Environmental Policy Act of 1969 requires Federal agencies to prepare environmental compliance documents for Federal actions, which would include consideration of the effects of proposed actions on special status species, including Arizona willow. Section 404 of the Federal Water Pollution Control Act of 1948 (Clean Water Act), as amended, Federal Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands), and State of Arizona Executive Order 89-16 (Streams and Riparian Resources) also provide protection of Arizona willow habitat under certain conditions. The Corps of Engineers has stated that many stream reaches providing Arizona willow habitat are under the jurisdiction of section 404 permitting of the Clean Water Act (Souder 1993). However, each of these regulatory mechanisms have certain exemptions and exceptions which will preclude the protection of Arizona willow and its habitat from a variety of project actions.

The National Forest Management Act of 1976 and its implementing regulations require the FS to manage national forest to provide enough habitat to maintain viable populations of native species, such as Arizona willow. These regulations define a viable population as one which "has the estimated numbers and distribution of reproductive individuals to insure its continued existence." The Regional Forester of the Southwestern Region (Albuquerque, New Mexico) maintains a list of plant species on national forest lands which are considered to be sensitive. Arizona willow is included on this list. The Regional Forester of the Intermountain Region (Ogden, Utah) is currently reviewing a proposal for the designation of Arizona willow as a sensitive species. This process should be completed by April 1995. By policy, the Forests must evaluate any proposed action for possible negative effects to sensitive species. FS policy also requires a permit to collect sensitive species, including Arizona willow on the Forest (USDA Forest Service, Forest Service Manual, Title 2800, *in litt.* 1986).

Previously, a cooperative agreement and Memorandum of Understanding (Agreement # 14-16-0002-91-219, and MOU # MU-RM-91-138) for the management of Arizona willow was entered with the Apache-Sitgreaves NFs, FS Rocky Mountain Forest and Range Experimental Station, Fish and Wildlife Service, and Arizona Game and Fish Department. The agreement was signed April 12, 1991 and called for certain conservation planning actions. The agreement specified objectives to define long-term recovery goals, describe recovery actions, identify information and research needs, and to develop management and monitoring plans for the species in fiscal year 1991. This agreement expired in 1994.

The Tribe, as a sovereign entity, has adopted numerous codes, regulations, procedures, and policies that govern activities on the Fort Apache Indian Reservation. These laws and regulations govern land management, livestock grazing, health and safety, timber harvest, road construction, collection of biological materials, wildlife management, and recreation use. Many of these provisions serve to protect Arizona willow and its habitat. The Tribe has designated all streams as well as adjacent riparian zones as "sensitive fish and wildlife areas." In addition, the Tribe has restricted activities in high elevation riparian areas. The Tribal range and forage management plans contains explicit provisions to protect sensitive riparian areas. The Tribe has closed many areas of the Reservation to most activities. The Tribal Game and Fish Code explicitly prohibits the taking and disturbance of plants without a valid Tribal permit. Violation of these laws may give rise not only to Tribal but also to federal prosecution. Scientific collections on the Reservation are also regulated and applications for collection permits must be submitted to the Tribal Chairman and be approved by the Tribal Council.

The Arizona willow is recognized by the State Heritage Programs in Utah and Arizona as a globally ranked "G2" (G=global) species. Species' "G" ranks are coordinated through The Nature Conservancy National Office and the various State Heritage Programs. The G2 ranking is based on the low number of populations and the vulnerability of many of the known sites. Utah and Arizona Heritage Programs, within the Utah Division of Wildlife Resources and AGFD respectively, rank Arizona willow as an "S2" (S=State) species. An S2 state ranking is based on the limited number of populations within each state.

PART III

ARIZONA WILLOW CONSERVATION STRATEGY

ARIZONA WILLOW CONSERVATION STRATEGY

I. INTRODUCTION

The high elevation riparian ecosystems which support Arizona willow in the states of Utah and Arizona have undergone significant changes through habitat loss, degradation, and from the influence of other human-related actions. These impacts have been less severe on Arizona willow populations on Utah's Markagunt Plateau which supports some of the densest and healthiest known stands. The conservation of the Arizona willow will require the restoration of degraded habitats and the natural processes and functions of associated riparian systems. The following strategy establishes conservation unit objectives, standards and criteria, and conservation actions for the long-term management of Arizona willow.

II. PURPOSE

The purpose of this Conservation Strategy is to outline a framework for management actions which will provide for the goal of long-term conservation of Arizona willow and its ecosystems throughout its range. The conservation of Arizona willow will require reducing threats, improving degraded habitat conditions, and restoring many of the natural functions of associated riparian systems. These habitat protection efforts will also benefit many other threatened, endangered, and sensitive plants and animals which share these ecosystems (Appendix F). Ensuring Arizona willow population viability and stability throughout its range may require several decades of intensive efforts. A variety of research projects on the population biology and ecology of Arizona willow will need to be undertaken to fully understand the implications of land management actions. Such studies will help determine appropriate management practices and identify potential areas for expanding and augmenting depauperate populations.

This strategy identifies specific actions that are necessary to reduce threats and provide for the long-term conservation of Arizona willow, and so, listing under the Endangered Species Act (ESA) by the U.S. Fish and Wildlife Service (FWS) would not be warranted. The short-term actions are to stabilize populations of Arizona willow by reducing immediate threats that inhibit

growth, reproduction, and seedling establishment, and contribute to mortality. The accomplishment of many long-term actions will require further National Environmental Policy Act (NEPA) analysis prior to full implementation as part of this Conservation Strategy.

III. CONSERVATION UNITS

The conservation of Arizona willow will depend upon successful management and protection of Arizona willow populations and the unique high elevation communities and ecosystems of which it is a part throughout the range of the species. This will require conservation of abiotic and biotic factors which contribute to genetic diversity at population, community, and ecosystem levels through the maintenance of natural environmental processes. To achieve these objectives across the range of the species and to effectively direct management actions, Arizona willow "conservation units" are identified within its currently known distribution. Conservation units are identified so that characteristic levels of genetic diversity are maintained in representative and extreme populations of Arizona willow, and geographic patterns of genetic diversity and the genetic integrity of representative populations are protected. Protection of each conservation unit will contribute to the maintenance of diversity on a landscape or ecosystem level.

Conservation units for Arizona willow are based on watersheds which feed high elevation riparian ecosystems in Arizona and Utah where plants and potential habitats are known to occur. Eight conservation units are identified: the Black River, Castle Creek, Fremont, Little Colorado River, Mammoth, Parowan, Sevier, and White River watersheds. In Arizona, the conservation units managed by the Apache-Sitgreaves National Forests (NFs) are the Black River watershed and the Little Colorado River watershed (Figure 4). Both the Black River and White River Watershed Conservation Units are on the Fort Apache Indian Reservation and managed by the White Mountain Apache Tribe (Tribe) (Figure 4). Arizona willow conservation units in Utah include the Castle Creek, Mammoth, Parowan, and Sevier watersheds on the Dixie NF (Figure 5), and the Fremont watershed on the Fishlake NF (Figure 6).

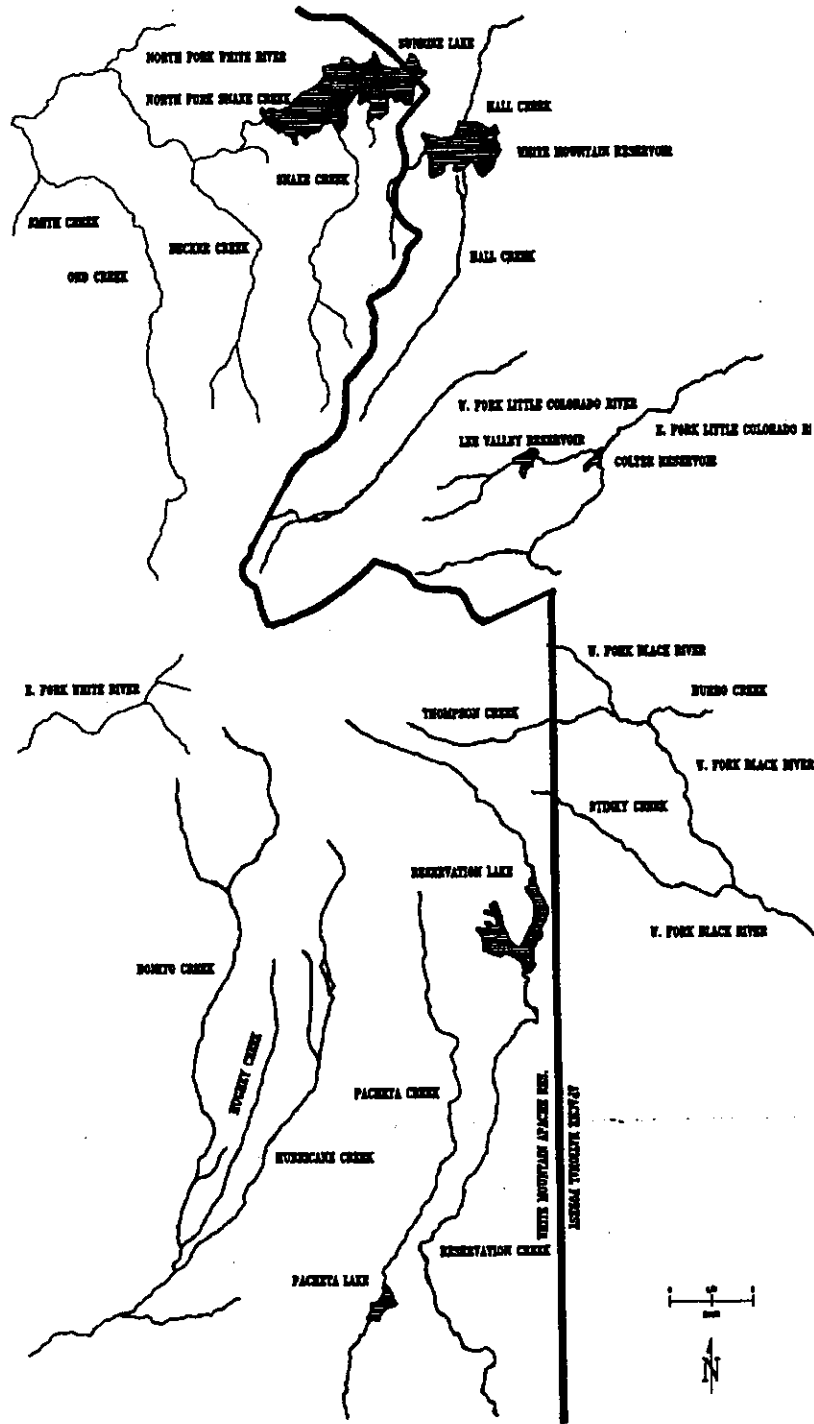


Figure 4. Arizona willow conservation units in the White Mountains of Arizona, on the Apache-Sitgreaves National Forests and the Fort Apache Indian Reservation.

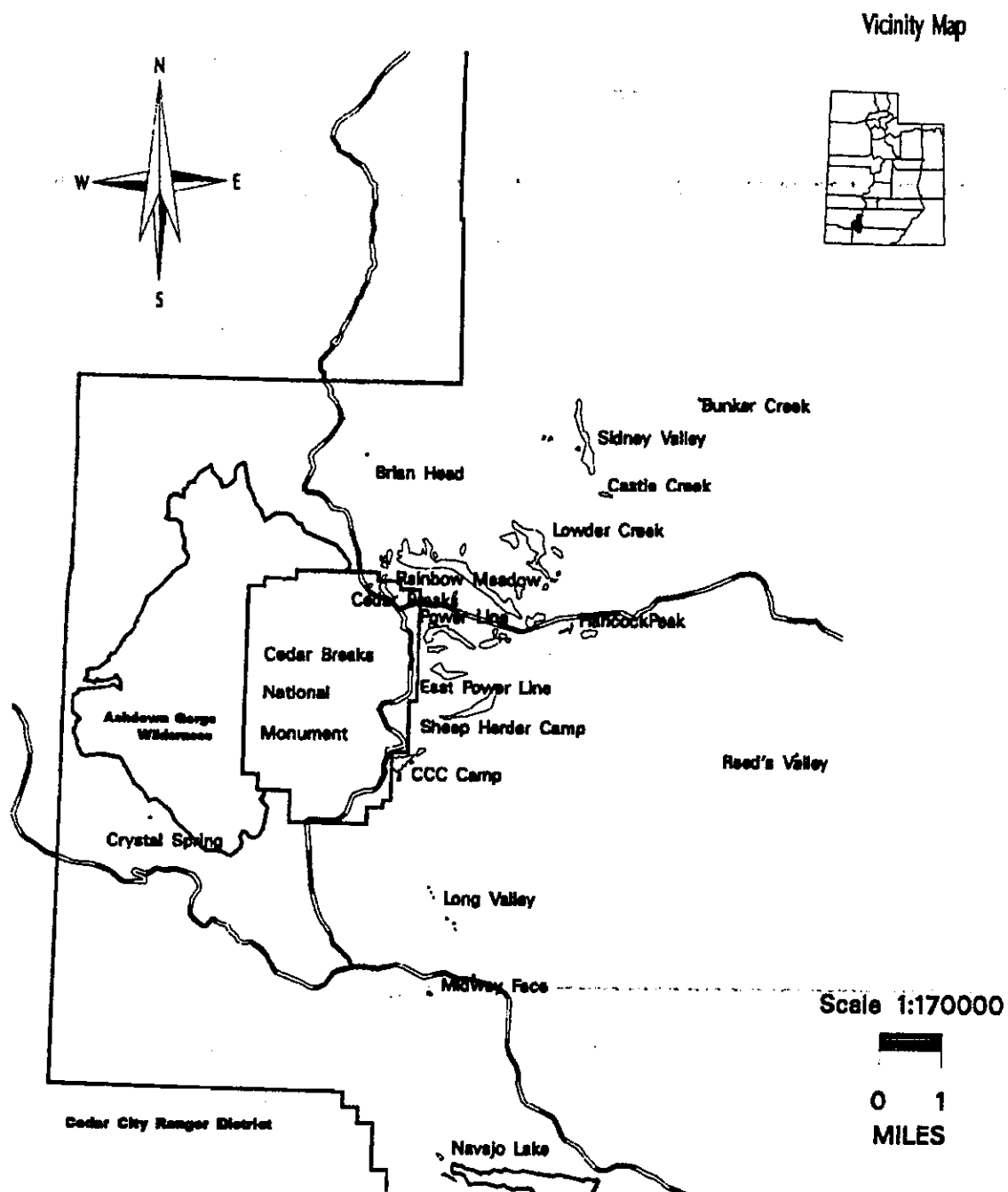


Figure 5. Arizona willow conservation units in the vicinity of Brian Head Peak, Utah, on the Dixie National Forest and Cedar Breaks National Monument.

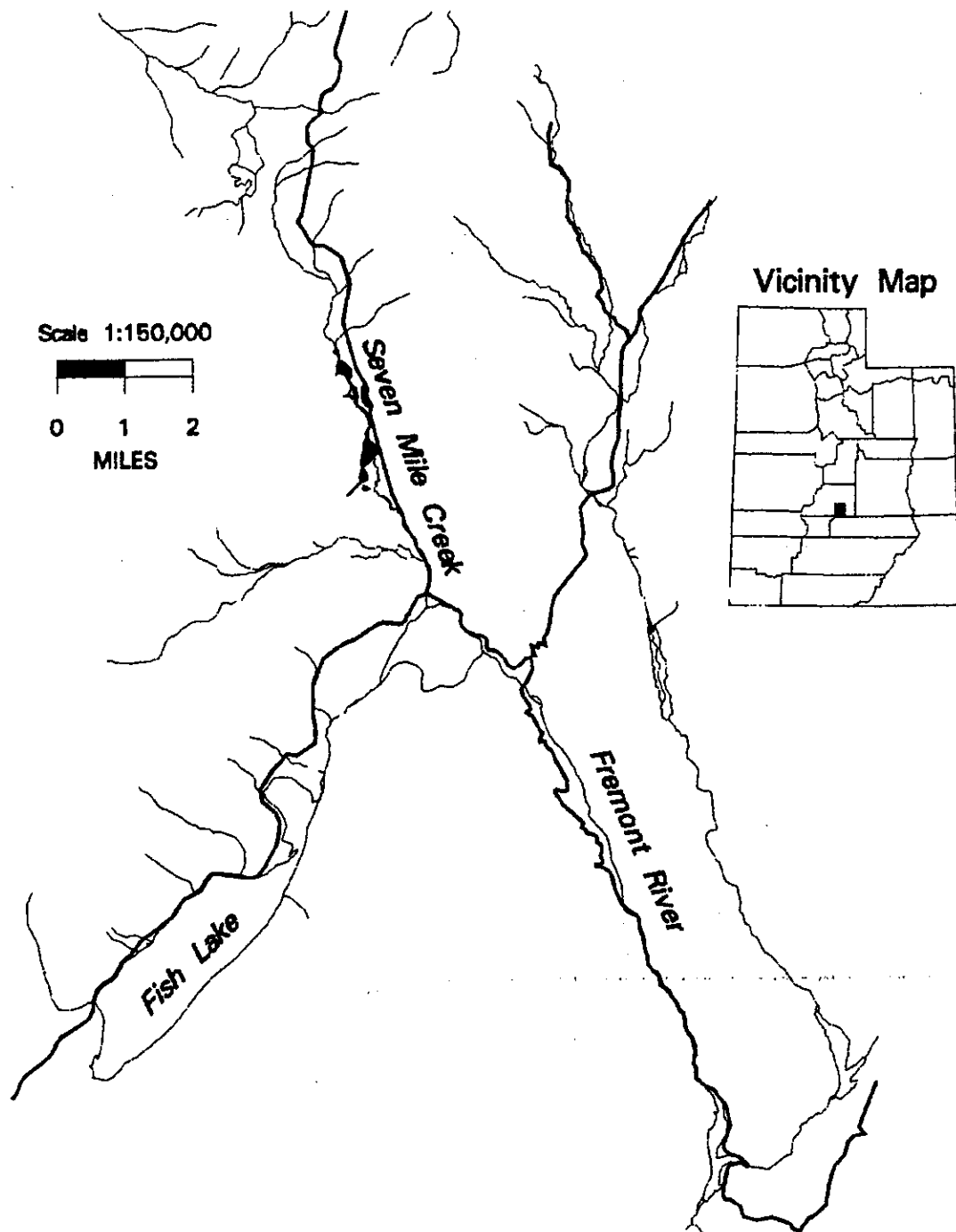


Figure 6. Arizona willow conservation unit on the Fish Lake Plateau, Utah, Fishlake National Forest.

Conservation units are the recovery analysis areas, and specific measures are established for each conservation unit. These criteria often require the assessment of plant vigor and habitat conditions.

To measure individual plant vigor, health, and reproductive viability, the following measures are applied.

1. Quantitatively demonstrate increases in annual leader growth by documenting incremental increases and gains in mean plant size through a five-year period.
2. Quantitatively demonstrate a decrease in vigor and/or mortality, as contributed to by disease factors which manifest in leaf loss, twig dieback, loss of stems, and plant mortality, through a five year period.
3. Quantitatively demonstrate that 25-50% of the lateral shoots of primary stems produce catkins that result in production of seeds from female plants as evaluated over a five year period. The number of male and female plants present in the population must be adequate to ensure cross pollination and genetic diversity.

To measure improvements in habitat conditions, the following measures are applied.

1. Quantitatively demonstrate a decrease in the proportion of exotic plant species and other "nondesirable" species through management programs that control or maintain levels of exotics without compromising native biological diversity.
2. Quantitatively demonstrate natural processes are present in the system to allow for the distribution of various ecological stages within the watershed. These natural processes may be on long-term cycles, and affect ecological succession, forest canopy closure, encroachment of conifers into meadows, and reductions in water (stream, springs, seeps) flow. Hydrologic processes create gravel bars, stream meanders, and effect channel development including bank stabilization and the control of channel downcutting.

The following are specific measurable parameters for the management of Arizona willow within each designated conservation unit.

A. Black River Conservation Unit:

1. On non-Tribal lands, enhance small populations with propagules, cuttings, and/or propagated plants such that small populations increase to at least 100 sexually reproductive individuals that become and remain established for at least ten years.
2. On non-Tribal lands, increases in plant vigor, health, and reproductive viability are demonstrated over a period of five years, such that the total number of reproductively viable individuals within half of the populations increase by at least 25%, and seedlings are established.
3. Refer to the White Mountain Apache Tribe Arizona Willow Management Plan for management objectives on Tribal land.

B. Castle Creek Conservation Unit:

1. Maintain current conditions with protective measures in place.

C. Fremont Conservation Unit:

1. Increases in plant vigor, health, and reproductive viability is demonstrated over a period of five years, such that the total numbers of reproductively viable individuals increase by at least 25%, and seedlings are established.
2. Quantitatively demonstrate improvement in habitat conditions specifically with regard to decreases in sediment loads, and the functioning of ecological processes.

D. Little Colorado River Conservation Unit:

1. Enhance small populations with propagules, cuttings, and/or propagated plants such that small populations increase to at least 100 sexually reproductive individuals that become and remain established for at least ten years.
2. Increases in plant vigor, health, and reproductive viability are demonstrated over a period of five years, such that the total number of reproductively viable individuals within half of the populations increase by at least 25%, and seedlings are established.
3. Quantitatively demonstrate improvement in habitat conditions specifically with regard to decreases in exotic plant species, and the functioning of natural ecological processes.

E. Mammoth Conservation Unit:

1. Maintain current conditions with protective measures in place with the exception of the CCC Camp and Sheep Herder populations.
2. Increases in plant vigor, health, and reproductive viability is demonstrated for the CCC Camp and Sheep Herder populations over a period of five years, and seedlings are established.
3. Quantitatively demonstrate improvement in habitat conditions specifically with regard to sediment loads, increases in native plant species cover, and the functioning of natural ecological processes for the CCC Camp population.
4. Quantitatively demonstrate improvement in habitat conditions specifically with regard to water quality, raised water table, stability of stream banks, and the functioning of natural ecological processes for the Sheep Herder population.

F. Parowan Conservation Unit:

1. Maintain current conditions with protective measures in place.

G. Sevier Conservation Unit:

1. Enhance this small population with propagules, cuttings, and/or propagated plants such that the population increases to at least 100 sexually reproductive individuals that remain established for at least ten years.
2. Increases in plant vigor, health, and reproductive viability are demonstrated over a period of five years, and seedlings are established.
3. Quantitatively demonstrate improvement in habitat conditions specifically with regard to sediment loads and the functioning of ecological processes.

H. White River Conservation Unit:

1. Refer to the White Mountain Apache Tribe Arizona Willow Management Plan for management objectives on Tribal lands.

IV. CONSERVATION STANDARDS AND CRITERIA

The following conservation standards and criteria define those essential components needed to understand the species' biology, ecology, genetics, restoration, and management needs, as well as those specific administrative elements necessary to ensure long-term management continuity and commitment. These will be used, in part, to measure whether the conservation objectives have been accomplished.

- A. Scientific data indicate that each conservation unit sustains populations that are viable or that are on a significant upward trend towards viability that is maintained for at least ten years.

1. Collect and analyze biological and ecological data throughout Arizona willow's natural range to determine reproductive biology, genetic makeup, habitat requirements, ecological relationships, and responses to competition, disease, and predation.
 2. Conduct surveys and inventories to determine the overall distribution and status of Arizona willow, define potential habitat, and quantify density and abundance.
 3. Provide survey data and results of research activities in a timely manner to all interested parties through the Arizona Game and Fish Department (AGFD) and Utah Division of Wildlife Resources (UDWR) Heritage Program databases as the central repository of site-specific information. Tribal information will be managed by the Tribe pursuant to the "Statement of the Relationship between the White Mountain Apache Tribe and the U.S. Fish and Wildlife Service" (December 6, 1994).
- B. Unfragmented and high-quality habitat sufficient to ensure long-term survival and recovery is protected within each conservation unit.
1. Enforce existing laws and regulations for the protection of Arizona willow populations.
 2. Identify and implement actions required to reduce existing and potential threats to known populations of Arizona willow.
 3. Ensure that viable populations and genetic diversity are maintained throughout the species' range.
 4. Retain federal lands containing Arizona willow in federal ownership. Acquisition of significant habitats in private ownership with Arizona willow should be pursued when feasible.

5. Designate special management areas such as Botanical Areas, Research Natural Areas, and essential habitat, where appropriate, for the protection and conservation of Arizona willow within each conservation unit.
6. Implement, through administrative procedures, the Arizona Willow Conservation Agreement and Strategy and incorporate provisions of this strategy into agency planning documents and budgets to ensure consistent implementation.
7. Provide mechanisms to oversee implementation of the Arizona Willow Conservation Agreement and Strategy and evaluate the success of these conservation actions through the Arizona Willow Interagency Technical Team.
8. Increase public awareness, appreciation, and support for the conservation of Arizona willow.

V. OUTLINE OF CONSERVATION ACTIONS

The conservation actions described within this outline need to be implemented so that the conservation objectives for each conservation unit are accomplished. Conservation actions are listed in a step-down form in which the broad categories of the conservation standards and criteria are stepped down to specific conservation actions. Table 1 lists the priority tasks including responsible parties, time frames, and estimated costs.

- A. Scientific data indicate that each conservation unit sustains populations that are viable or that are on a significant upward trend towards viability that is maintained for at least ten years.

- A1. Collect and analyze biological and ecological data throughout Arizona willow's natural range to determine reproductive biology, genetic makeup, habitat requirements, ecological relationships, and responses to competition, disease, and predation. Best management efforts are guided by

good biological and ecological information. Monitoring, studies, and research are necessary to define and document population viability. Baseline biological and ecological data are essential for evaluation and documentation of species trend and to determine the most appropriate management actions. Accomplishment of these efforts will depend, in part, on the results of research on Arizona willow population biology and ecology. Encourage participation of persons outside of the land management units, such as the Rocky Mountain Forest and Range Experimental Station, Intermountain Forest and Range Experiment Station, AGFD, UDWR, universities, and other interested parties to participate in research related to Arizona willow and its ecosystems.

- 1a. Develop uniform monitoring protocols in cooperation with participating agencies and interested persons which can be consistently applied and used across the range of the species. Monitoring data forms should be developed that will be completed at regular site visits to provide complete documentation.
- 1b. Establish baseline data and implement long-term monitoring programs to gather biological and demographic data to evaluate population and habitat trends, identify site-specific threats, track changes in the status of Arizona willow, determine effectiveness of management strategies, and redirect management priorities where necessary.
- 1c. Determine impacts of cattle and elk herbivory to Arizona willow based on degree of herbivory and season of use; identify other herbivores which may contribute to important levels of herbivory and how various ecological parameters affect selection and use. Reduce herbivore related impacts to Arizona willow and its habitats where necessary. Herbivory reduces the amount of leaves and stems on plants and affects photosynthetic outputs. Field observations indicate that numerous herbivores feed on Arizona willow. Herbivory by cattle and elk are the most prominent, but the impacts of rodent and insect herbivory is

unknown. By using three-way exclosures the additive effects of herbivory from various species can be evaluated (i.e. exposing Arizona willow to herbivory from all herbivores, excluding livestock only, and excluding all large ungulates).

The AGFD and UDWR are committed to actively participate with FS, FWS and other interested parties in the development and implementation of monitoring and research activities to determine the effects of wildlife and livestock herbivory on Arizona willow populations.

- 1c.1. Construct three-way ungulate exclosures on Stinky Creek, Lowder Pond, East Fork of Sevier, Sheep Herder, and Seven Mile populations. This will help determine the impacts of herbivory and the influence of large ungulates on habitat conditions and trends.
- 1c.2. FWS will provide funding to assist in research activities on Arizona willow herbivory (\$22,000 study) supported through 1994 ESA Section 6 funds.
- 1d. Determine the levels of genetic variation among populations and genetic distances between populations. The overall genetic-variation within the species and among populations of Arizona willow is unknown. Patterns in genetic variation can tell much about the genetic health of populations and will help determine population conservation priorities for the species. In addition, knowledge of genetic variation across populations will be beneficial for enhancing small populations in the wild and for building representative *ex situ* gene pools of the species. Studies proposed by Harper et al. (1994) will aid in understanding this question.
- 1e. Study the differences in biology of upright and prostate growth forms. To date, there is little information about the factors that are responsible

for the variety of growth forms that Arizona willow exhibits. It is unclear whether growth form variation is induced by environmental/external conditions or genetic factors. Propagules and cuttings from each growth type can be grown in a common garden to determine whether growth forms will persist. In addition, the phenology, reproductive potential, and plant responses to herbivores can be assessed based on growth form from common garden experiments. Studies underway at The Arboretum at Flagstaff will help to understand this question.

- 1f. Assess the timing and causes of mortality. Because various abiotic and biotic factors may contribute to Arizona willow deaths, it is important to track timing and determine causes of mortality to help with management decisions. Knowing the timing and causes of mortality is the first step toward eliminating these threats to the species. The demographic studies in progress by Harper and Taylor (1994) will be helpful for determining mortality factors.
- 1g. Determine how Arizona willow is affected by rust infection. Rust conditions should continue to be monitored. Preliminary studies are underway in Utah (Harper and Taylor 1994) and Arizona (Fairweather pers. comm. 1994; Granfelt pers. comm. 1994). The consequences of rust infection to Arizona willow populations may be dependant on population size and various ecological factors which may contribute to stress (Fairweather 1993).
- 1h. Describe Arizona willow pollination biology and ecology and determine the relative role of wind and insect pollination based on the proportion of male and female plants within limited or highly dispersed populations. Insect pollinators of Arizona willow need to be determined and also whether or not production of seed is limited by pollinators.

- 1i. Determine the requirements for seedling recruitment. Arizona willow seedling recruitment has rarely been documented during the past five years. According to Argus (1986), the primary ecological determinants for the establishment and growth of most willows are a moist substrate for seed germination and ample sunlight for subsequent growth. Studies done on another high elevation willow, Bebb willow (*Salix bebbiana*), indicate that soil moisture, timing and availability of water and light, herbivory, and the availability of germination sites free from competition by other plants all effect germination and survival of seedlings (Atchley 1989, Gori 1991, Waring 1991a, 1991b, Maschinski 1991, 1992). Similar factors are likely to influence Arizona willow seedling survival and recruitment. Investigating these requirements will enable managers to create potential patches of habitat that may enhance Arizona willow recruitment. Studies are underway in Utah by Harper and Taylor (1994) and proposed in Arizona (FWS funding proposal through section 6 of the Act).
- 1j. Determine the impacts of disturbance agents, such as fire, scouring, and flooding on seedling recruitment and plant growth. Because little seedling recruitment is occurring and plant growth is stunted in some locations, it is possible that conditions are not optimal for plant growth or seedling establishment and survival. Disturbance agents, such as fire, scouring, and flooding, may play a role in removing organic sediments from stream channels and competitive plants from stream banks so that Arizona willow seeds can reach wet substrates conducive for germination. Plant growth may also be enhanced by disturbance agents through soil aeration and removal of plant competitors.
- 1k. Assess, on an experimental basis, how manually removing sediment, building gravel beds, or introducing varying particle-sized gravel will affect seedling recruitment. Increasing the number of individuals within many of the conservation units is essential for the conservation of the

species. It is likely that, in the presence of altered ecosystem processes, artificially modifying stream channels can increase the optimal space available for Arizona willow germination and growth. Experimental stream modifications should be undertaken on a small scale to determine what factors can enhance seedling recruitment. These modifications may be the most effective way to enhance recruitment and genetic diversity in wild populations.

11. Determine the impacts of exotic plant species on the health and function of riparian habitats and Arizona willow. Reduce the numbers of exotic and other non-desirable plants, such as Kentucky bluegrass, within riparian ecosystems where appropriate. The extent to which exotic plant species, such as Kentucky bluegrass (*Poa pratensis*), are affecting the overall quality of Arizona willow habitat is unknown. To determine the degree of detrimental effects of the presence of Kentucky bluegrass on Arizona willow growth and reproduction, studies should be conducted where the grass is removed from treatment plots. Compare Arizona willow growth and recruitment between treated and control plots.
- A2. Conduct surveys and inventories to determine the overall distribution of Arizona willow, define potential habitat, and quantify density and abundance. Arizona willow has been well surveyed within the White Mountains of Arizona. However, efforts in Utah started in late June 1994 on the Dixie NF, and in early August 1994 on the Fishlake NF. Arizona willow was found on both the Dixie and Fishlake NFs, and more surveys are needed. Additional potential habitat may exist in southern Utah, southwestern Colorado, Arizona, and New Mexico. At five year intervals, additional surveys should be undertaken to see if the willow has expanded into previously surveyed potential habitat.
- 2a. Conduct additional surveys for Arizona willow in areas with similar habitat characteristics in New Mexico, Colorado, Utah, and Arizona.

To better understand the distribution of Arizona willow, surveys in high elevation meadows should be continued. It is especially important to survey for Arizona willow in areas that have proposed land management projects.

- 2b. Complete and maintain updated detailed maps of the distribution of individuals/populations using global positioning systems (GPS) and geographic information systems (GIS) technology. Some populations and subpopulations should be inventoried and mapped to quantify existing populations with statistical accuracy and assess habitat quality.
- A3. Provide survey data and results of research activities in a timely manner to all interested parties through the AGFD and UDWR Heritage Program databases as the central repositories of site-specific information. Tribal information will be managed by the Tribe pursuant to the "Statement of the Relationship between the White Mountain Apache Tribe and the U.S. Fish and Wildlife Service" (December 6, 1994).
- 3a. The Dixie and Fishlake NFs will transmit to the UDWR Utah Natural Heritage Program (UTNHP) all positive and negative data collected on Arizona willow by FS field personnel pursuant to its responsibilities under the interagency Memorandum of-Understanding (MOU) entitled, *Utah Conservation Effort for Sensitive, Candidate and Listed Species.* The UTNHP serves as the central repository for site-specific information for sensitive species in Utah pursuant to its responsibilities under the same MOU. The UTNHP assures the FS that sensitive location data will be protected under the provisions of the Government Records Access and Management Act (Utah Code 63-2-101 *et seq.*), and biennial data dumps are provided to the FS pursuant to the MOU.
 - 3b. The Apache-Sitgreaves NFs will provide all site-specific data, both positive and negative, to the AGFD Heritage Data Management System

(HDMS). The HDMS serves as the central repository for site-specific information for sensitive species in Arizona.

3c. The Tribe's Game and Fish Department will retain all Arizona willow site-specific data on Tribal lands as proprietary information of a sovereign government.

3d. Encourage Rocky Mountain Forest and Range Experiment Station to complete reports for studies undertaken as part of the 1991 Cooperative Agreement.

B. Unfragmented and high-quality habitat sufficient to ensure long-term survival and recovery is protected within each conservation unit.

B1. Enforce existing laws and regulations for the protection of Arizona willow populations.

1a. FWS Utah Ecological Services Office, will Notify Corps of Engineers in writing on locations of Arizona willow populations in Utah to ensure Clean Water Act section 404 permits issued for proposed developments in willow habitat within jurisdictional wetlands consider Arizona willow. Important populations of Arizona willow in Utah occur on private lands. Since Arizona willow habitat is within the definition of jurisdictional wetlands, consideration under the Clean Water Act is one of the few protection mechanisms available on non-federal lands.

1b. Retain Arizona willow on the Regional Foresters' Sensitive Species lists. Maintain Arizona willow on the USDA Forest Service (FS) Southwestern Region Regional Forester's list of sensitive species (U.S. Forest Service, Southwestern Region, 1992). Add Arizona willow to the sensitive species list for the FS Intermountain Region. FS policy requires that Forests maintain viable populations of sensitive species and to consider

the effects of proposed actions on sensitive species through the preparation of a Biological Evaluation.

- 1c. Implement Standards and Guidelines from Forest Plans within Arizona willow habitat, especially for riparian areas. Fully implement the Regional Foresters' policy statement of December 19, 1994. Forest Plans have included many specific Standards and Guides to mitigate adverse effects of various actions. Because watercourses are crucial to environmental health and also provide habitats which support many rare and sensitive species, the management of riparian areas are specially addressed in each Forest Plan. Implementing existing management criteria (Appendix A for Apache-Sitgreaves NFs, Appendix B for the Dixie NF, and Appendix C for the Fishlake NF) and fully implementing the Regional Foresters' policy statement (Part IV, A) throughout Arizona willow habitat, will help to manage or restore riparian ecosystems and to achieve a balance of ecological stages which will provide various conditions necessary for growth, reproduction, and long-term survival of Arizona willow and associated species.
- B2. Identify and implement actions required to reduce existing and potential threats to known populations of Arizona willow. Populations of Arizona willow should be protected by reducing direct and indirect effects of habitat degradation and reducing damage to plants by herbivores. The reduction of threats to Arizona willow will require a series of immediate actions and additional long-term measures. Some immediate protective actions include fencing, resting or deferring pasture use by livestock, placing cages around individual plants, providing protective buffers from timber harvest activities, and mitigating siltation and other hydrologic effects from roads and water diversions.

The AGFD is committed to pursuing potential funding sources which may be needed to protect and enhance Arizona willow populations in conjunction with

other sensitive stream/riparian species and habitat management activities (see Part IV, D).

- 2a. Protect populations from cattle herbivory and minimize the degradation of riparian habitats by livestock. Arizona willow is palatable to cattle and can be heavily utilized. Riparian areas supporting Arizona willow populations that have degraded conditions should be protected from cattle herbivory. Indications of degraded habitat conditions which herbivory may be a contributing or causative factor include, high sediment loads, unstable stream banks, channel widening, bank sloughing and erosion, gradual stream channel trenching or braiding with concurrent replacement of riparian vegetation by more xeric plant species, change, reduction, and/or elimination of vegetation (Branson 1975, Platts and Raleigh 1984).
- 2a.1. Construct two electric fences in Sidney Valley to exclude Arizona willow habitat from cattle grazing.
- 2a.2. Relocate pasture fence or construct electric fence below Lee Valley Reservoir on the Apache-Sitgreaves NFs to protect Arizona willow from livestock impacts.
- 2a.3. Construct riparian ecosystem protection fencing along part of the Seven Mile drainage to exclude cattle grazing.
- 2b. Manage elk for stable or reduced numbers in Arizona conservation units to lessen utilization of Arizona willow and minimize potential impacts to riparian habitats. Some Arizona willow populations in Arizona show indications of high utilization by elk. Because Arizona willow shows signs of stunted growth and hedging in habitats heavily visited by elk (but not cattle) and because elk may contribute to indirect degradation of riparian habitats in ways similar to cattle, elk populations should not be

enhanced above current levels pending the outcome of studies on the impact of elk herbivory on Arizona willow. Portions of Arizona willow populations in sites heavily used by elk should be protected from herbivory by caging and/or fencing. Preference for protection should be given to plants growing near headwaters or in upstream situations. Protection will increase the likelihood that plants will set flower and produce seed. The individual plants that are protected should be changed every five years to increase the probability of diverse genotypes being represented in the population.

The AGFD is committed to aggressively managing elk populations in the elk management units which may affect Arizona willow populations consistent with monitoring and research information. This strategy will include the current stabilization of elk populations in the Greer, Greens Peak, Black River and Milligan Valley elk management units (see Part IV, D).

The AGFD is committed to annually updating and revising the Region I - Elk Operational Plan population management objectives to respond to willow management concerns for elk management units which contain Arizona willow populations (Part IV, D).

Elk populations in Utah conservation units are substantially lower than in Arizona. The UDWR is committed to updating and revising the elk and mule deer management plans' population management objectives in response to willow management concerns, on at least a five-year basis, for units which contain Arizona willow populations (Part IV, F).

The UDWR is committed to managing elk, mule deer, moose, and pronghorn antelope within Management Plan guidelines and consistent with monitoring and research information on Arizona willow populations (Part IV, F).

- 2c. Monitor use on Arizona willow by the moose reported in the Seven Mile drainage. Field observations will be made on any utilization of Arizona willow by moose.
- 2d. Monitor impacts of beaver herbivory and stream damming. Beaver dams can potentially inundate large numbers of Arizona willow plants, or may improve habitat conditions in some drainages (e.g., East Fork Sevier). Beaver impacts will be assessed on a site-specific basis.
- 2e. Minimize the impacts of heavy recreational use in Arizona willow habitat. Manifestations of recreational impacts include trailing by humans and horses along, through, and across streams; soil compaction; sedimentation from trails; fence cutting; bank instability; and facilities (e.g., ski lodges, equipment buildings, campgrounds, and horse corrals). Actions that can alleviate the impacts of recreation include providing crossover steps at fences to prevent fence cutting, bridged stream crossings, rerouting trails, restricting access to sensitive areas, and educating people through signs and special use permits on how to minimize the impacts of their recreational activities. Areas of angler concentrations need to be assessed in cooperation with State and Tribal wildlife agencies to help with future management decisions for certain high use sites (Mount Baldy Wilderness Area, Sheeps Crossing, Phelps Cabin, Reservation Lake, Seven Mile Creek, and East Fork Sevier).
- 2f. Minimize siltation and erosion caused by road building and traffic by closing and obliterating some roads and/or paving or dust-oiling portions of roads near riparian areas where Arizona willow occurs. Roads are the primary source of sediment from forested watersheds (Stednick 1987). Sediment production from roads increases with road gradient and proximity to stream course. Soil type is also an important factor. Because siltation and aggrading base levels are major problems with many

streams in Arizona willow habitat, efforts are needed to minimize siltation from road-related sources.

2f.1. Forest Supervisor will issue a 261 closure order for the East Fork of the Sevier Watershed to eliminate motorized impacts on the Arizona willow habitats. Direction issued will include language about use of vehicles on roads, trails, meadows, and along riparian streams.

2f.2. Investigate the possibility of a road closure for the Powerline population.

2g. Avoid any water diversions including dam construction, ditch building, or rechanneling that could adversely affect Arizona willow populations downstream. Arizona willow requires perennial water and is not capable of withstanding either drought or inundation. Even small water diversions can result in lowering the water table which may stress or desiccate plants. Therefore, new water diversions should be avoided when construction will affect Arizona willow populations.

2h. Minimize or eliminate impacts of timber harvests upstream from Arizona willow populations. Establish a minimum of a 100-foot buffer for riparian areas providing Arizona willow habitat for all timber harvest activities. Timber harvests and associated activities, such as road building and log skidding, contribute to sediment loads in streams. For all timber harvest activities, follow best management practices and special riparian management standards and guidelines as described in the Forest Plans.

B3. Ensure that viable populations and genetic diversity are maintained throughout the species' range. The conservation of Arizona willow will require management of biotic and genetic diversity at population, community,

and ecosystem levels. To achieve this goal and to effectively direct management actions, watershed-based "conservation units" have been designated as the recovery analysis areas.

- 3a. Further the conservation of Arizona willow and other sensitive species by appropriate use of active management tools (e.g. prescribed fire, vegetation manipulation, and water management); manage exotic species to avoid threats to the diversity of native species, natural biological communities, or natural processes. Incorporate the results of research studies into active management of Arizona willow and its habitat as data becomes available to determine appropriate management techniques.
- 3b. Manage and/or restore riparian ecosystems to achieve a mix of ecological stages which will provide various conditions necessary for growth, reproduction, and long-term survival of Arizona willow and associated species. The ecological conditions which favor growth of established Arizona willow plants are expected to be somewhat different from those specific hydrologically-controlled conditions which provide germination and seedling establishment sites. By providing a broad array of naturally occurring riparian and stream habitats within a dynamically functioning system, the potential viability of Arizona willow populations may be greatly enhanced.
- 3c. For populations whose existence is threatened by low numbers of individuals, introduce seeds, cuttings, or individuals to stabilize and maintain a viable population. There are several sites, especially on the Apache-Sitgreaves NFs, where there are 25 or fewer individual plant units. To address the problems potentially encountered by small populations, specific augmentation plans should be developed for small populations within each conservation unit. The augmentation plan should identify the source of propagules for augmentation, a monitoring plan, and criteria for determining success of augmentation. When

genetic (DNA) analysis is completed on Arizona willow populations and degrees of relatedness among populations have been determined, appropriate sites of propagule sources for augmentation can be identified. Until DNA analysis is completed, augmentation should be accomplished with propagules from plants growing within the same drainage whenever possible. Propagules may be from seed (if available) or rooted cuttings. Seeds introduced to the headwaters or sown in moist, coarse-grained soils along the stream may increase recruitment into the population. Any augmentation efforts must be monitored yearly for ten years in order to determine the success of the effort. A successful augmentation will result in a population of greater than 100 individuals which have been established and reproducing for at least ten years.

- 3d. Establish an *ex situ* population as a precaution against the demise of wild populations. To assure the survival of Arizona willow, genetically representative cultivated populations, as determined from the results of DNA analysis and/or representing over half of the wild populations, should be maintained in botanical gardens. These cultivated populations will be insurance against catastrophic declines of the wild populations. In addition, cultivated populations will provide material for research studies and sources of seed or cuttings for reintroduction efforts. The Arboretum at Flagstaff, a member institution of the Center for Plant Conservation, is already growing cultivated populations of Arizona willow.

- B4. Retain federal lands containing Arizona willow in federal ownership. Acquisition of significant habitats in private ownership with Arizona willow should be pursued when feasible.

- 4a. Continue to pursue land acquisition within the Powerline population.

- 4b. Continue to pursue acquisition of private properties on the West Fork of the Black River.

B5. Designate special management areas such as Botanical Areas, Research Natural Areas, and essential habitat, where appropriate, for the protection and conservation of Arizona willow within each conservation unit. Special management area designation assures the priority of Arizona willow management within a multiple-use framework. Areas where issues of biodiversity, ecological processes, and/or Arizona willow conservation are the primary management objectives accomplishes the intent of special area designations.

- 5a. Investigate the need for designation of "essential habitat" under Regional Forester's authority. Forest Service Manual (FSM 2670.5) direction authorizes the Regional Forester to designate "essential habitat" to meet "recovery objectives for endangered, threatened, and proposed species and those necessary to maintain viable populations of sensitive species." The designation of essential habitat requires the evaluation of project-related impacts to these habitats even in the absence of the species in order to provide expansion habitat.
- 5b. Evaluate the boundary of Phelps Cabin Botanical Area and Goodding Research Natural Area for possible expansion and redesignation.
- 5c. Investigate opportunities for designating Rainbow Meadows as a Botanical Area or Research Natural Area.
- 5d. Continue site protection activities on the Cedar Breaks National Monument populations and map known populations.
- 5e. Develop conservation agreements or easements between FWS and private landowners for populations occurring on private land. A significant

portion of Arizona willow occurs on private lands in Utah on the Markagunt Plateau in the vicinity of Brian Head Peak. An agreement between FWS and private land owners should be developed that reduces threats and contributes to the conservation of Arizona willow. These agreements and the management of these Arizona willow populations should be coordinated with neighboring private landowners and Dixie NF.

- B6. Implement, through administrative procedures, the Arizona Willow Conservation Agreement and Strategy, and incorporate provisions of this strategy into agency planning documents and budgets to ensure consistent implementation. Agency commitments that provide for long-term protection of Arizona willow and its ecosystems must be incorporated into land management planning documents and be adequately budgeted to ensure implementation.
- 6a. Conduct a workload analysis to determine the budgetary and botanical staffing needs for Forests implementing actions for Arizona willow and associated threatened, endangered, and sensitive species in their ecosystems. A workload analysis is necessary to ensure that Forests are able to implement the commitments associated with this Conservation Strategy.
- 6b. Determine costs and time frames for implementing conservation strategies and identify personnel responsible for completing each action.
- 6c. Revise Land and Resource Management Plans as necessary to incorporate conservation strategies and management commitments for Arizona willow. Ensure that budgets are programmed to allow for implementation of the Conservation Strategy.

6d. Revise Allotment Management Plans (AMPs) to minimize or eliminate adverse affects of livestock to Arizona willow populations and its habitats and to be consistent with the provisions of the Arizona Willow Conservation Agreement and Strategy. AMPs that address livestock grazing in Arizona willow habitat should be developed or revised to conform with the provisions of this Conservation Agreement and Strategy.

- Monitoring of Arizona willow and its habitat should occur prior to livestock entering the unit and after livestock have been removed.
- Inspection and maintenance of pasture fences are required.
- Identify locations of protection fencing.
- Define desired future conditions that would enhance Arizona willow populations and its habitats.
- Apply management techniques so that the combined utilization of Arizona willow by livestock and wildlife will avoid moderate to heavy use.
- Livestock mineral supplements and holding facilities will be located away from riparian habitats and at least 0.4 km (0.25 mile) of known Arizona willow populations.
- Utilization and habitat condition and trend should be continually monitored; stocking rates and grazing systems should be adjusted as necessary to meet the intent of the Arizona Willow Conservation Agreement and Strategy.

- Opportunities should be made available to livestock operators to heighten their awareness of Arizona willow and associated management issues.

6d.1. Review the grazing plan for the East Fork of the Sevier population. Address watershed problems and issues of cattle distribution through the allotment management planning and grazing permit administration processes. Adjustments will be made in annual operating plans to meet the standards of this strategy.

6d.2 Revise the Voigt and Greer AMPs within the Little Colorado Ecosystem Planning Unit by October 1996 if the decision is made to stock the allotment.

B7. Provide mechanisms to oversee implementation of the Arizona Willow Conservation Agreement and Strategy and to evaluate the success of these conservation actions through the Arizona Willow Interagency Technical Team.

7a. Representation on the Arizona Willow Interagency Technical Team should include personnel from each land and resource management agency and other interested parties. The responsibilities of the team are to identify and schedule long-term conservation actions; develop monitoring protocols; coordinate studies and research activities; annually review selected projects taken (or not taken) as part of this strategy; distribute annual progress reports; and exchange information on the biology, ecology, monitoring, and management of Arizona willow. The Team will review, consolidate, and report on the status of Arizona willow and the implementation of this Conservation Agreement and Strategy; review new scientific information to identify additional

research needs; consider modifications of the strategies as appropriate; and provide management recommendations. FWS will chair this Team.

- B8. Increase public awareness, appreciation, and support for the conservation of Arizona willow. Public education is an important component in the conservation of a species. The cooperation of the public will be essential for the ultimate success of ongoing conservation actions. Signs informing the public about conservation projects (such as protective fences and cages) should be posted in heavily visited areas. Information articles on Arizona willow's rarity and conservation efforts can be written for local papers by all cooperators. Involving local citizens and Tribal members with conservation efforts will help ensure public support and understanding of the needs of Arizona willow and its ecosystems.

- 8a. Develop a citizen's participation plan to increase public awareness, appreciation, and support for restoration and management of natural riparian ecosystems.
- 8b. FWS will notify and educate private landowners with Arizona willow populations of the presence and importance of the species and determine if there are plans for private actions that may affect Arizona willow (e.g., water pumping, diversions, home/road construction).

Table 1. Summary of Short- and Long-Term Conservation Tasks.

Site	Conservation Actions		Budget by Year	NEPA Compliance	Responsibility	Watershed
	Short Term	Long Term				
ARIZONA Reservation Boundary	Pasture Rest and Cages	Greer AMP target 10/96, LCEU plans and NEPA by 10/95	\$850 1995 \$500 1996	Short-Admin Action, Long-EA	Apache-Sitgreaves NFs	Little Colorado
Hall Creek	Pasture Rest	Greer AMP target 10/96, LCEU plans and NEPA by 10/95	\$500 1995 \$500 1996	Short-Admin Action, Long-EA	Apache-Sitgreaves NFs	Little Colorado
WFLC in Wilderness	Pasture Rest	Greer AMP target 10/96, LCEU plans and NEPA by 10/95	\$500 1995 \$500 1996	Short-Admin Action, Long-EA	Apache-Sitgreaves NFs	Little Colorado
Sheeps Crossing	Cages	Greer AMP target 10/96, LCEU plans and NEPA by 10/95	\$900 1995 \$500 1996	Short-Categ. Exclus., Long-EA	Apache-Sitgreaves NFs	Little Colorado
Above Lee Valley Res.	Pasture Rest	Voigt AMP target 10/96, LCEU plans and NEPA 10/95	\$500 1995 \$500 1996	Short-Admin Action, Long-EA	Apache-Sitgreaves NFs	Little Colorado
Lee Valley Res. to Colter Res.	New Fencing and Cages	Voigt AMP target 10/96, LCEU plans and NEPA 10/95	\$1,800 1995 \$500 1996	Short-Admin Action and Categ. Exclus., Long-EA	Apache-Sitgreaves NFs	Little Colorado
Voigt Cabin	Cages	Voigt AMP target 10/96, LCEU plans and NEPA 10/95	\$950 1995 \$500 1996	Short-Categ. Exclus., Long-EA	Apache-Sitgreaves NFs	Little Colorado
South Tributary EFLC above Phelps	Pasture Rest	Voigt AMP target 10/96, LCEU plans and NEPA 10/95	\$500 1995 \$500 1996	Short-Admin Action, Long-EA	Apache-Sitgreaves NFs	Little Colorado
EFLC above Phelps	Pasture Rest	Voigt AMP target 10/96, LCEU plans and NEPA by 10/95	\$500 1995 \$500 1996	Short-Admin Action, Long-EA	Apache-Sitgreaves NFs	Little Colorado
Phelps Botanical Area and Phelps RNA	Maintain existing fencing	LCEU plans and NEPA by 10/95, Voigt AMP target 10/96, re-evaluate RNA bounds 10/95	\$500/year for fence maintenance	Short-no NEPA, maintenance only, Long-EA	Apache-Sitgreaves NFs	Little Colorado
EFLC below Phelps to Colter Reservoir	Pasture Rest and/or Cages/Fencing	Voigt AMP target 10/96, LCEU plans and NEPA by 10/95	\$4,100 1995 \$500 1996	Short-Admin. Action and Categ. Exclus., Long-EA	Apache-Sitgreaves NFs	Little Colorado
EFLC below Colter Reservoir	Cages	Voigt AMP target 10/96, LCEU plans and NEPA by 10/95	\$1,000 1995 \$500 1996	Short-Categ. Exclus., Long-EA	Apache-Sitgreaves NFs	Little Colorado

Table 1. Summary of Short- and Long-Term Conservation Tasks, continued.

Site	Conservation Actions		Budget by Year	NEPA Compliance	Responsibility	Watershed
	Short Term	Long Term				
ARIZONA (cont.) Thompson Ranch	Cages and New Fencing	Burro Creek AMP done, implement plans	\$7,000 1995	NEPA done	Apache-Sitgreaves NFs	Black River
Below Thompson Ranch	Cages and New Fencing	Burro Creek AMP done, implement plans	\$13,650 1995	NEPA done	Apache-Sitgreaves NFs	Black River
Stinky Creek	Exclosure and New Fencing	Burro Creek AMP done, implement plans, also road crossings hardened-3yrs.	\$5,000 1995	NEPA done	Apache-Sitgreaves NFs	Black River
UTAH Brian Head Peak	Site monitoring through 1997	Site monitoring through 1999, then re-evaluate in 2000	\$200/year	Monitoring through range administration.	Dixie NF	Parowan
Brian Head Town	Contract pvt. land owner inform and educate.	Conservation easement, COE 404 permits	\$1,000 in 1995	None, COE 404 permits	Mtn. - Prairie Region: FWS	Parowan
Bunker Creek	Site monitoring through 1997.	Site monitoring through 1999, re-evaluate in 2000.	\$500/yr through 1997. \$100 in 1998. \$100 in 1999. \$500 in 2000, \$200 to re-evaluate. Up to \$8,000.	Monitoring through range administration.	Dixie NF	Panguitch
CCC Camp	100-foot buffer Site monitoring through 1997	Site monitoring through 1999, re-evaluate in 2000. Evaluate all proposed projects in potential habitat.	\$2,000 in 1995 \$1,000 in 1996 \$1,300 in 1997 \$200 in 1998 \$200 in 1999 \$1,000 in 2000	None	NPS/FWS	Mammoth

Table 1. Summary of Short- and Long-Term Conservation Tasks, continued.

Site	Conservation Actions		Budget by Year	NEPA Compliance	Responsibility	Watershed
	Short Term	Long Term				
UTAH (cont.) Castle Creek	Site monitoring through 1997	Site monitoring through 1999, re-evaluate in 2000.	\$1,000 in 1995 \$500 in 1996 \$500 in 1997 \$100 in 1998 \$100 in 1999 \$1,000 in 2000 Up to \$8,000	Monitoring through range administration.	Dixie NF	Mammoth
Cedar Breaks	100-foot buffer					
	Site monitoring through 1997.	Site monitoring through 1999, re-evaluate in 2000.	\$200/year	None	NPS	Mammoth
Crystal Springs	Repair pole fence around spring, and monitor effectiveness.	Site monitoring through 1999, re-evaluate in 2000.	\$500 in 1995 \$200 in 1996 \$200/year thereafter.	None, Maintenance only	Dixie NF	Coal Creek
East Fork Sevier	Construction of protection/research enclosure. Develop recreation plan to include closure for OHVs & dispersed camping on non-designated trails and camp sites. Implement standards in AMP.	Site monitoring through 1999, re-evaluate in 2000. Enforce OHV travel plan. Implement standards in AMP.	\$10,000 in 1994 for enclosure construction. \$3,000 in 1995 \$2,000 in 1996 \$2,500 in 1997 \$200 in 1998 \$200 in 1999 \$2,000 in 2000	Scope research enclosure project, then implement.	Dixie NF	East Fork of Sevier River
East Power Line	100-foot buffer.		Up to \$8,000			
	Site monitoring through 1997.	Site monitoring through 1999, re-evaluate in 2000.	\$500/year	Monitoring through range administration.	Dixie NF	Mammoth
Hancock Peak	Site monitoring through 1997.	Site monitoring through 1999, re-evaluate in 2000.	\$500/year	Monitoring through range administration.	Dixie NF	Mammoth
	100-foot buffer.		Up to \$8,000			

Table 1. Summary of Short- and Long-Term Conservation Tasks, continued.

Site	Conservation Actions		Budget by Year	NEPA Compliance	Responsibility	Watershed
	Short Term	Long Term				
UTAH (cont.) Long Valley	Site monitoring through 1997.	Site monitoring through 1999, re-evaluate in 2000.	\$500/year	Monitoring through range administration.	Dixie NF	Mammoth
Lowder Creek	Construction of protection/research exclosure. Develop recreational plan for ORV use within riparian areas. Implement standards in AMP.	Site monitoring through 1999, re-evaluate in 2000. Enforce ORV travel plan. Implement standards in AMP.	\$10,000 in 1994 for exclosure construction. \$3,000 in 1995 \$2,000 in 1996 \$2,500 in 1997 \$200 in 1998 \$200 in 1999 \$2,000 in 2000 Up to \$8,000	Scope research exclosure project, then implement.	Dixie NF	Mammoth
Midway Face	100-foot buffer. Site monitoring through 1997.	Site monitoring through 1999, re-evaluate in 2000.	\$500/year Up to \$8,000	Monitoring through range administration.	Dixie NF	Asay
Navajo Lake	100-foot buffer. Site monitoring through 1997.	Site monitoring through 1999, re-evaluate in 2000.	\$500/year Up to \$8,000	Monitoring through range administration.	Dixie NF	Asay
Power Line	Site monitoring through 1997. Check with power company on road easement. Check on land acquisition. 100-foot buffer.	Site monitoring through 1999, re-evaluate in 2000.	\$500/year Up to \$8,000	Monitoring through range administration.	Dixie NF	Mammoth

Table 1. Summary of Short- and Long-Term Conservation Tasks, continued.

Site	Conservation Actions		Budget by Year	NEPA Compliance	Responsibility	Watershed
	Short Term	Long Term				
UTAH (cont.) Rainbow Meadows	Site monitoring through 1997.	Site monitoring through 1999, re-evaluate in 2000.	\$2,000 in 1995 \$1,000 in 1996 \$1,000 in 1997 \$1,000 in 1998 \$1,000 in 1999 \$1,500 in 2000 Up to \$8,000	Monitoring through range administration.	Dixie NF	Mammoth
Reed's Valley	100-foot buffer. Site monitoring through 1997.	Site monitoring through 1999, re-evaluate in 2000.	\$500/year Up to \$8,000	Monitoring through range administration.	Dixie NF	Mammoth
Seven Mile	100-foot buffer. Purchase fence materials for protection fence construction of protection/research exclosure. Implement standards in AMP.	Site monitoring through 1999, re-evaluate in 2000. Enforce ORV travel plan. Implement standards in AMP.	\$25,000 1994 \$33,000 1995 \$5,500 in 1996 \$5,000 in 1997 \$2,000 in 1998 \$2,000 in 1999 \$10,000 2000	Protection fence constructed under existing AMP decision. Scope research exclosure project, then implement.	Fishlake NF	Fremont
Sheep Herder	Construction of protection/research exclosure. Develop recreational plan for ORV use within riparian areas. Implement standards in AMP. 100-foot buffer.	Site monitoring through 1999, re-evaluate in 2000. Enforce ORV travel plan. Implement standards in AMP.	\$3,000 in 1995 \$2,000 in 1996 \$2,500 in 1997 \$500 in 1998 \$500 in 1999 \$2,000 in 2000	Scope research exclosure project, then implement.	Dixie NF	Mammoth

Table 1. Summary of Short- and Long-Term Conservation Tasks, continued.

Site	Conservation Actions		Budget by Year	NEPA Compliance	Responsibility	Watershed
	Short Term	Long Term				
UTAH (cont.) Sidney Valley	Site monitoring through 1997. 100-foot buffer.	Site monitoring through 1999, re-evaluate in 2000.	\$2,300 in 1995 \$800 in 1996 \$800 in 1997 \$500 in 1998 \$500 in 1999 \$1,000 in 2000 Up to \$8,000	Monitoring through range administration.	Dixie NF	Mammoth

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GLOSSARY

Abiotic - Non-living.

Adverse Effects - Actions, programs or events which reduce the viability of individuals and/or populations of a species.

Allotment Management Plan (AMP) - A livestock grazing management plan dealing with a specific unit of rangeland and based on multiple use resource management objectives. The AMP considers livestock grazing in relation to other uses of rangelands and in relation to renewable resources--watershed, vegetation, and wildlife. An AMP establishes the seasons of use, the number of livestock to be permitted on rangelands, and the rangeland improvements needed.

AMP - Abbreviation for allotment management plan

Anaerobic Condition - A soil situation where a soil strata is devoid of oxygen.

Arizona Willow - The plant species *Salix arizonica*, a low to medium statured shrub in the family Salicaceae, endemic to high elevation riparian wetlands in eastern Arizona and southern Utah.

Biological - Of or pertaining to biology.

Botanical - Of or related to plants.

Botanist - A journey level biologist trained in the study of plants.

Buffer - A boundary around a special riparian management area to insulate this area from adverse impacts originating from outside the area (e.g. Arizona willow populations adjacent to timber sales in Rainbow Meadows).

Cienega - A spanish term for a native wetland or marsh area of the southwest.

Clean Water Act - Requirement for application for section 404 permits before filling of jurisdictional wetlands. Permits are issued by the U.S. Army Corps of Engineers after an analysis is completed of impacts and mitigation needed to protect rare resources.

Clone - A population of genetically identical individuals which develops through asexual reproduction.

Conservation Action - An action taken to conserve or preserve natural resources (e.g. for Arizona willow plants or its habitat).

Conservation Agreement - A formal, written document agreed to by the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service and another Federal agency, Tribe, State agency, local government, or private agency organization, or individual to achieve the conservation or recovery of threatened or endangered species through voluntary cooperation. A Conservation Agreement documents the specific actions and responsibilities for which each party agrees to be held accountable. The objective of a Conservation Agreement is to achieve the recovery of a threatened, endangered, and/or candidate species.

Conservation Easement - A real estate covenant restricting the use of real property to provide for the protection or enhancement of an environmental value or use of that property.

Conservation Strategy - A written plan of actions or strategies to study, manage, and protect rare species and their habitats based on the best available scientific data.

Conservation Standards or Criteria - A set of standards, criteria, rules, or requirements on which management and protective strategies are made to meet species viability requirements and eliminate the potential loss of a species.

Conservation Objectives - Specific actions necessary for achieving the purpose of the conservation plan for the Arizona willow.

Conservation Plan - A detailed set of documents (a plan) that summarizes current data on Arizona willow, the specific actions needed for protection, restoration and management of the species and its habitat, and a signed conservation agreement with all parties involved to insure implementation.

Conservation Unit - A specific area (watershed or areas within a watershed) where known populations of Arizona willow occur and where specific actions must be implemented to remove threats to the species and restore habitat conditions to potential natural conditions.

Conserve - To protect from loss or depletion, preserve.

Demographic - The study of the characteristics of a population (e.g. for Arizona willow; size, growth, density, distribution, and other biological requirements of the species).

Disjunct - A species or populations of a species separated or disconnected by many miles, such as Arizona willow populations in east-central Arizona and southwestern Utah.

Downward Trend - a reduction in numbers of plants or size of a population based on established scientific baseline data and changes are documented through research monitoring activities.

EA - Abbreviation for environmental analysis report.

Ecology - The science of the relationships between organisms and their environment.

Ecosystem - The integrated sum of plant and animal populations interacting with the abiotic components.

Effectiveness Monitoring - Monitoring designed to determine the effectiveness of conservation structures, measures and/or actions.

EFLCR - Abbreviation for East Fork of the Little Colorado River.

ESA - Abbreviation for Endangered Species Act of 1973, as amended.

Essential Habitat - Those areas which are essential for maintenance of genetic diversity and the continued existence of viable populations of Arizona willow throughout its range. This would include conservation of large populations and small populations adapted to unique soil types, differing hydrological regimes, unique plant communities, conditions at the edge of the species range or unusually diverse local environmental complexes. It may also include portions of unsurveyed adjacent habitat which may be suitable and could provide for natural expansion of the species.

Exotic - Species not native to the place in question (e.g. *Poa pratensis* populations in western North America introduced from another region).

FACA - Abbreviation for Federal Advisory Committee Act.

Forest Service Policy Statement - A Region 3 and Region 4 Regional Forester's policy statement for management and protection of Arizona willow issued December 19, 1994.

Genetic Diversity - The genetic make-up or constitution of an individual, group, or class of organisms. For Arizona willow, the total genetic make-up of the species throughout its natural range within and between populations.

Genotype - The genetic constitution of an organism, especially as distinguished from its physical appearance.

Habitat - The area in which an organism lives. Determined by a combination of factors including biotic and abiotic components of the immediate environment.

Habitat Improvements - Structural or nonstructural activities which are conducted in existing or potential habitat of Arizona willow.

Herbivory - The consumption of Arizona willow plants by animals and insects.

Hybrid - An individual produced from genetically different parents; the offspring produced by breeding plants or animals of different varieties, species, or races.

Individual - A single individual considered separately from its group or clone (e.g. a seedling).

Introgression - The incorporation of genes from one species or subspecies into another related species or subspecies. It arises as a result of successful hybridization and subsequent backcrossing of the hybrids with one of the parental populations.

Inventories - The process of conducting surveys to determine the total distribution and numbers of Arizona willow.

Lead Agency - The agency responsible for ensuring implementation of the Arizona willow conservation agreement and strategy.

LCEU -Abbreviation for Little Colorado Ecosystem Analysis.

LRMP -Abbreviation for Land and Water Management Plan.

NEPA - Abbreviation for National Environmental Policy Act.

NFMA - Abbreviation for National Forest Management Act.

Occupied Habitat - Areas of land occupied, covered or filled by Arizona willow plants or clones.

Out Year - Budget or fiscal year beyond the current year considered in fiscal planning.

Photo Plot - A photograph taken of Arizona willow in a specific area, at a specific time using specific protocol to document existing conditions and any changes.

Population - A local community of potentially interbreeding Arizona willow plants.

Potential Habitat - An area of land exactly like or similar to a known location occupied by Arizona willow.

Propagule - Seed.

Proposed Rule - U.S. Fish and Wildlife Service 57 FR 54747 proposed rulemaking to list Arizona willow as an endangered species.

Restoration - Specific actions taken to improve or restore Arizona willow habitat or associated ecosystems to potential natural conditions.

RNA - Abbreviation for Research Natural Area.

Seedling Recruitment - The natural replacement of Arizona willow plants through germination and establishment in its natural habitat.

Sensitive Species - All species that are under status review, have small or declining populations, or live in unique habitats. May also be any species needing special management. Sensitive species include threatened, endangered, and proposed species as classified by the Fish and Wildlife Service. In the Forest Service, sensitive species are designated by regional foresters for non listed threatened and endangered species.

Short-Term - The removal of threats in order to forestall the need for listing Arizona willow as threatened or endangered.

Stable Population - A population of Arizona willow without significant impacts to the species or its habitat demonstrated by existence of large, healthy, reproducing plants with excellent vigor and leader growth (e.g. Rainbow Meadows, Dixie National Forest).

Standards and Guides - A set of standards, rules, requirements or guidelines developed in FLMPs to manage and protect natural resources to meet the preferred management alternatives for management areas on public lands.

Studies - Studies completed on Arizona willow to answer administration questions for management decisions on the species verses longer-term research efforts.

Surveys - Field surveys completed during the peak flowering periods for Arizona willow, June - August, to determine the species distribution in potential habitat.

Sustainability - The maintenance of a healthy, desired habitat condition for Arizona willow or preferable plant growth requirements to insure reproduction potential for the species.

Technical Team - An interagency team of specialists established by management to develop the Arizona willow conservation agreement and conservation strategy, and act as the Regional Foresters', and Regional Directors' representatives for implementation.

Threats - Ongoing or potential actions having negative or potential negative impacts to Arizona willow or its habitat.

Viable Population - An Arizona willow population that has the estimated numbers and distribution of reproductive individuals to ensure the continued existence of the species throughout its existing range within a given planning area (paraphrased from FSM 2670.5.22).

Viability - Having the ability to naturally reproduce (sexually or asexually), develop, and produce healthy populations of a species, under potential natural conditions, to insure genetic diversity is maintained through cross pollination and mixing of the gene pool.

Watershed - The total area above a given point on a waterway that contributes runoff water to the streamflow at that point.

WFLCR - Abbreviation for West Fork of the Little Colorado River.

Workload Analysis - Assessment of the personnel and funding needed to accomplish essential components of the general botany and plant conservation program.

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PART IV

ARIZONA WILLOW CONSERVATION STRATEGIES BY MANAGEMENT AGENCY

A. Forest Service Policy Letter



United States
Department of
Agriculture

Forest
Service

Dixie
National
Forest

File Code: 2670
Route To: 1950

Date: December 19, 1994

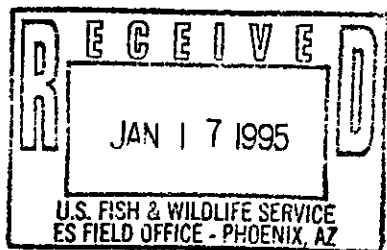
Subject: Policy re: Arizona Willow Conservation

To: Forest Supervisors: Apache-Sitgreaves, Dixie, and
Fishlake National Forests

In our September 6, 1994 meeting in Denver, Colorado, we made a joint decision with the U.S. Fish and Wildlife Service (FWS) to develop a Conservation Agreement and Strategy for the management of Arizona willow. This letter outlines our policy to provide for the immediate implementation of consistent standards for the management of Arizona willow habitat on National Forest System lands. This policy implements the intent of our National Threatened, Endangered, and Sensitive Policy (FSM 2670) and the Endangered Species Act by providing for the long-term conservation of Arizona willow and its ecosystem.

Our Joint Regional Policy:

1. Reduce adverse effects to Arizona willow and its habitat. Forest Supervisors will fully implement existing Forest Plan Standards and Guides. During National Environmental Policy Act (NEPA) analyses for all activities implementing Forest Plans, our policy is to eliminate, reduce, or mitigate adverse effects to Arizona willow.
2. Establish special resource protection and management guidelines for Arizona willow habitat through Conservation Agreements, Strategies, and Assessments done in full cooperation with FWS.
3. Pursue opportunities to improve internal and external awareness about conservation of the Arizona willow ecosystem. Informing the public is essential to the success of this conservation effort.
4. Fully involve FWS and appropriate State agencies as cooperators or partners throughout the NEPA process for all projects likely to affect Arizona willow or its habitat.



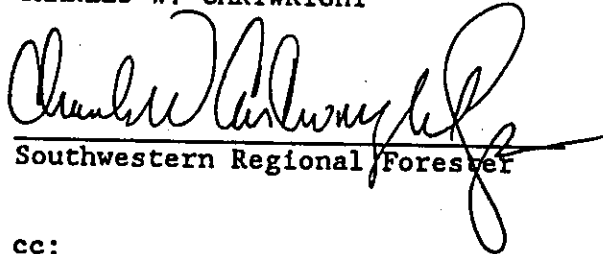
Caring for the Land and Serving People



December 19, 1994

The Forest Service representatives on the Arizona willow interagency team are designated as our technical representatives to monitor and review the implementation of this policy. The primary responsibility for the development, implementation, and success of the Arizona Willow Conservation Agreement and Strategy rests with you as line officers.

CHARLES W. CARTWRIGHT


Southwestern Regional Forester

DALE N. BOSWORTH


Intermountain Regional Forester

cc:

Mr. Reed Harris
U.S. Fish and Wildlife Service
Lincoln Plaza
145 E. 1300 S.
Suite 404
Salt Lake City, UT 84115

Mr. Sam Spiller
U.S. Fish and Wildlife Service
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Phoenix, AZ 85021-4951

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Albuquerque, NM 87103

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Arizona Game and Fish Department
2221 W. Greenway Rd.
Phoenix, AZ 85023

PART IV

**ARIZONA WILLOW
CONSERVATION STRATEGIES BY
MANAGEMENT AGENCY**

B. Apache-Sitgreaves National Forests

ARIZONA WILLOW CONSERVATION STRATEGY

Apache-Sitgreaves National Forests Strategy by Population

Removal of the threats to the Arizona willow over the long term hinges on completion of analysis and plans for the Little Colorado Ecosystem Planning Unit. All but fifteen of the known Arizona willow plants on the Forests occur within this planning unit. Definition of the "desired future condition" for this planning unit will include conditions necessary for a sustainable population of Arizona willow. Products of this planning effort will include new Allotment Management Plans for the Greer and Voigt Allotments as well as other resource management plans (various timber sales, urban interface fuel reduction projects by Greer, Lee Valley Creek trout habitat restoration, recreation improvements, management plans for the Baldy Wilderness, Phelps RNA improvements, State Road 273 relocation/surfacing, etc) to address issues and assist in achieving desired future conditions. Development of management plans and project proposals will meet the requirements of the National Environmental Policy Act and the Endangered Species Act as well as other applicable laws and regulations. Planning will be conducted with full public involvement.

This Conservation Strategy identifies interim actions to remove threats to the species of which we have some degree of control, while long term plans are being developed.

The strategy is presented for each of the 15 populations that were identified on the Forests by Renee Galeano-Popp in her 1988 survey.

Threats - The following are believed be threats to the survival of the Arizona willow on the Apache-Sitgreaves National Forests.

- 1) Browsing by cattle and/or elk
- 2) Defoliation by rodents and insects
- 3) Beavers cutting plants and flooding habitat through dam construction
- 4) Lack of seedling establishment and survival, which may be due to, in part, competition from dense herbaceous vegetation
- 5) Reduced regeneration, which may be due to, in part, an accumulation of fine sediments high in organic content
- 6) Reduced regeneration, which may be due to, in part, soils saturated with water for long time periods, causing anaerobic conditions
- 7) Unstable stream banks
- 8) Rust infection

Definitions

Plant unit - May include many individuals of different sex or may be a single plant. A separation greater than one meter between the closest foliage of two "clumps" must exist in order to be considered separate plant units. The fact that this definition is different than what was used by Galeano-Popp for her survey at least partially explains why plant unit numbers for each population may differ between this document and her initial survey.

Plant units mapped - Those plant units that have been mapped and described in sufficient detail so that a qualified individual who has not previously visited the site would be able to relocate them.

Cage - Structure used to enclose individual plant units or groups of plant units to protect them from ungulate browsing. Cages would be constructed five feet tall with field fence or "hog wire" supported by metal T posts. The tops would also be reinforced with rebar. They would vary in size but would generally be approximately 8 feet square. They are intended to protect plants from cattle and elk.

Protection Fencing - A more permanent structure to enclose individual plant units or groups of plant units to protect them from ungulate browsing. These structures would also vary in size depending on the site, with an anticipated range of sizes from 12 to 50 feet on a side. The intent is to completely enclose plant units and to allow the opportunity for expansion. These structures would be five feet tall constructed with five strands of barbed wire. Eight foot wooden posts would be used for corners. Support would be provided by metal T posts spaced at 12 to 16 foot intervals with two wooden stays between posts. These structures are also intended to protect plants from both cattle and elk. Even though an elk can jump a five foot fence, it is assumed they will be reluctant to do so considering the size of the proposed structures.

Livestock Management Fences - Four wire fences, 46" in height used to control the location of livestock. Allow for managing the timing, duration and intensity of livestock use.

Elk/Livestock Study Fences - Nine foot high constructed with field fence for complete exclusion of cattle and elk. Used to compare the effects of complete exclusion, to exclusion of just cattle to areas that are grazed by both animals.

Site: Population No. 1, Reservation Boundary.

Location: A small un-named tributary running north east into White Mountain Reservoir, west of Reservoir adjacent to fence at the White Mountain Apache Reservation boundary, upstream of State Route 273. A small stringer of trees follows the drainage into a large meadow, the two plants are located at the base of the trees furthest downstream and on the left bank, and approximately 315 feet from the Reservation fence. Bebb's willow carcasses are found in this location, with some presently alive.

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units: 2 (Popp"88) **Number of plant units mapped:** 2 (1994)

Last visited: throughout the summer and fall of 1994.

Habitat Acres: Occupied: 8.3 sq ft all one location

Potential: 10 ft wide X 1000 ft length = 0.23 acres

Riparian: 30 ft X 3800 ft = 2.62 acres

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: As of late summer 1994, these two plants seem to be in a static to slight downward trending condition. Signs of grazing have been noted in the past but this has not been extreme, and usually has not been the result of large ungulates but rather is assumed to be the result of rodent activities. In the past years one of these plants has been defoliated by insects (mourning cloak caterpillars). Leader growth has always been very short, not exceeding 6 mm per year.

Grazing Allotment Greer **Elk Herd Unit** Greer
Livestock Management Unit Baldy Pasture outside Wilderness

Site specific concerns: In the past, these plants have withstood relatively light grazing by livestock and/or elk, 20-30% defoliation by insects, and some tip die-back perhaps related to frost or fungal pathogens. These effects do not help the plant but have not been fatal. The greatest threat seems to be the small population size, and ecological conditions that result in extremely wet soil conditions, which combined with highly organic soils cause aeration to become limiting in the root zone. It is suspected that root growth is quite restricted by anaerobic conditions, which could result in limited twig elongation and small leaf sizes. Ground cover from other plants (mosses, sedges, and grasses) is high, which may limit the possibility of Arizona willow seedling establishment.

Recent past conservation actions: Stocking rates and duration have been reduced for this pasture in recent years. This allotment is permitted for 503 head of cattle 5/16-10/31. In 1993 this pasture was used for 18 days by 202 cows and calves, 6/16-7/03 (18 days, 160 AUMS). In 1994 this pasture was used for 22 days by 430 cows and yearlings and 29 bulls from 8/6-8/28 (22 days, 347 AUMS). A portion of the Slade Ranch, approximately 80 acres on the east side of Hall Creek has been acquired through a land exchange. When the legal boundaries are posted and exchange finalized, additional Arizona willow surveys will be conducted.

Proposed conservation actions

Short term: Rest the Baldy Pasture from livestock use while the new AMP is being developed. Enclose the two known plant units with a fence to protect them from elk and any unplanned livestock use. Complete this fence by June 1995.

Estimated Cost: \$350 FY95 Cage installation

Long term: Complete a new AMP for the Greer Allotment by 10/96 which will establish livestock management guidelines for approximately 10 years. Retain the status of private lands near White Mountain Reservoir as property desirable for acquisition into the National Forest system.

Estimated Cost: \$500 FY95 and 96 LCEU planning effort
\$200/yr monitoring

Monitoring: All plants will be monitored annually according to the established protocol. First monitoring information of this population is from Galeano-Popp's survey which was completed in 1988.

Site: Population No. 2, Hall Creek.

Location: Upper Hall Creek; 1.7 miles upstream from Highway 273, and 660 yards upstream of the Wilderness boundary (wooden decaying fence).

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 11 (Popp"88) **Number of plants units mapped** 10 (1994)

Last visited: summer and fall of 1994.

Habitat Acres: **Occupied:** 3 sites in upper totaling 58.7 sq ft 1994

Potential: discontinuous 30 ft wide X 2.3 miles = 8.3 acres from upper reaches to road SR 273

Riparian: 200 ft wide X 1.48 mi center 35.89 ac
60 ft X 1.05 mi upper 7.64 ac = 44 ac
10 ft X 0.38 mi below Slade 0.46 ac Total

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: As of late summer 1994, these plants seem to generally be in static condition, showing some small changes in size since Galeano-Popp's inventory in 1988. During most of the summer, grazing is overall very light to none, while by mid October grazing on some individuals was estimated from 50-95% of leaders, while other plants showed no use at all. During the last 7 years there has not been any change in the numbers of plants (one less was counted during 1994 likely due to inventory techniques and defining minimum spacing between plant units).

Grazing Allotment Greer **Elk Herd Unit** Greer
Livestock Management Unit Baldy Pasture within Wilderness

Site specific concerns: Grazing by livestock has been quite light and of short duration in the past few years, and browsing from elk seem to have been concentrated in the upper reaches of Hall Creek. Competition from other vegetation is severe and includes dense mosses, grasses and sedges. The surrounding meadows are in a late seral stage of succession, and disturbance from annual overbank flooding and resulting deposition of fresh sediment is extremely rare or non-existent. This portion of Arizona willow habitat is located relatively near the top of the watershed which is entirely within Wilderness. No management impacts have affected the vast majority of this watershed, and flow regimes are natural and un-regulated. However, any changes in flow regime since establishment of this willow population can be regarded as threatening. This can be the result of increasing crown cover in the forested part of the watershed, as well as type changes from a dominantly aspen composition to conifers. Evidence

of decreasing flows are visible in the form of stream channels becoming choked with vegetation and filling in to the point of near disappearance, as can be seen between the Wilderness and SR 273. The most promising section of habitat along Hall Creek is all upstream of the Wilderness boundary. Small population size may also be viewed as a concern.

Recent past conservation actions: Stocking rates and duration have been reduced for this pasture in recent years. This allotment is permitted for 503 head of cattle 5/16-10/31. In 1993 this pasture was used for 18 days by 202 cows and calves, 6/16-7/03 (18 days, 160 AUMS). In 1994 this pasture was used for 22 days by 430 cows and yearlings and 29 bulls from 8/6-8/28 (22 days, 347 AUMS). A portion of the Slade Ranch, approximately 80 acres on the east side of Hall Creek has been acquired through a land exchange. When the legal boundaries are posted and exchange finalized, surveys will be conducted.

Proposed conservation Actions

Short term: Rest the Baldy Unit from livestock use while the new AMP is being developed.

Estimated Cost: -0-

Long term: Complete a new AMP for the Greer Allotment by 10/96 which will establish livestock management guidelines for approximately 10 years. Retain the status of private lands near White Mountain Reservoir as property desirable for acquisition into the National Forest system.

Estimated Cost: \$500 FY95 and 96 LCEU planning efforts
\$200/yr monitoring

Monitoring: All plants will be monitored annually according to the established protocol. First monitoring information of this population is from Galeano-Popp's survey completed in 1988.

Site: Population No. 3, West Fork Little Colorado River within Wilderness.

Location: West Fork of the Little Colorado River all within the Mount Baldy Wilderness

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 363 (Popp "88) **Number plants units mapped** 258 (1994)
Difference due to 1994 inventory techniques which have been standardized and now require 1 meter between individual plant units. This required consolidation of previously separate plant units.

Last visited: summer and fall of 1994.

Habitat Acres: **Occupied:** 11,100 sq ft (Popp 1988), 34,230 sq ft 1994 census
Potential: 30 ft wide X 2.19 mi = 7.96 acres discontinuous
Riparian: Avg 100 ft max wide X 2.19 mi length = 26.55 ac
Width varies from 20 to 130 ft, 100 ft avg is generous.

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: This reach of habitat contains the densest population of Arizona willow on the Forest, and the plants in the mid portion of this reach are also in the best condition. The ecological conditions in the upper reach of this population seem to be better suited to the willow than elsewhere. The lower half of this stream reach is one of the best areas to expand the population in the future. Currently, the plants in this population are in relatively good condition, although individual plants have shown substantial use late in the year. Most of this reach of stream has very little floodplain area due to the confining valley slopes. This landform keeps all high flows mostly contained in the channel, which allows finer sediments to flush through instead of accumulating into wet meadows. Channel bedload materials are 100% mobile in the silt, sand, and gravel size class, and approximately 50% mobile in the cobble size class. Bedload mobility of this magnitude is seldom encountered elsewhere, and as a result fine sediments with anaerobic conditions are less often encountered in this area.

Grazing Allotment Greer **Elk Herd Unit** Greer
Livestock Management Unit Baldy Pasture within Wilderness

Site specific concerns: This population has withstood relatively light livestock grazing pressure in recent years, while in the past it has likely been heavier. Elk use appears mostly in late fall, and browsing use on willows is primarily on those plants which are easily accessible. Plants hidden in thickets get very little grazing use. As this area has very heavy recreational use, some of the habitat is impacted from fishing and hiking along trampled paths at creek side. The long

term solution to such recreation related problems will not be easy, as any development such as hardening fishing access trails will only encourage more use. Camping does not seem to be a problem due to lack of flat ground. Recreation issues will be dealt with in the Little Colorado Ecosystem Planning Unit. Other minor threats include occasional beaver activity only near the lower end of the population, and some rust infections which are generally not severe.

Recent past conservation actions: Stocking rates and duration have been reduced for this pasture in recent years. This allotment is permitted for 503 head of cattle 5/16-10/31. In 1993 this pasture was used for 18 days by 202 cows and calves, 6/16-7/03 (18 days, 160 AUMS). In 1994 this pasture was used for 22 days by 430 cows and yearlings, and 29 bulls from 8/6-8/28 (22 days, 347 AUMS). Livestock are regularly herded from the Sheeps Crossing area.

Proposed conservation actions

Short term: Rest the Baldy Unit from livestock use while the new AMP is being developed.

Estimated Cost: -0-

Long term: Complete a new AMP for the Greer Allotment by 10/96 which will establish livestock management guidelines for approximately 10 years.

Estimated Cost: \$500 FY95 and 96 LCEU planning effort
\$400/yr monitoring

Monitoring: Thirty-five plants (10%) distributed throughout the population will be monitored annually according to the established protocol. First available monitoring and inventory information of this population is from Galeano-Popp's survey completed in 1988.

Site: Population No. 4, Sheeps Crossing.

Location: West Fork of the Little Colorado River downstream from Mount Baldy Wilderness boundary including Sheeps Crossing

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 4 (Popp "88) Number of plants units mapped 4 (1994)

There may be 7 plants in this population, 3 further downstream not included in Galeano-Popp's 1987 inventory.

Last visited: throughout the summer and fall of 1994.

Habitat Acres: Occupied: 33.74 sq ft (Popp "88), 75.00 sq ft 1994 census

Potential: 30 ft wide X 1.43 mi = 5.20 ac

Riparian: 100 ft max avg width X 1.43 mi = 17.33 ac

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: This area get heavy recreational use, and paths are trampled at creek side for fishing access. The plants in this stretch are in variable shape ranging from excellent to heavily grazed. The riparian vegetation in this area is generally in good shape, but shows signs of stress from soil compaction, grazing, and beaver activity. Most dams in the area get washed out due to high flows, but some persist. The area could greatly benefit from rehabilitation efforts. The best habitat for Arizona willow is that which is furthest downstream. Upstream, competition for sunlight is high due to dense riparian vegetation and spruce overstory.

Grazing Allotment Greer Elk Herd Unit Greer

Livestock Management Unit East Side Pasture

Site specific concerns: Soil compaction and the possibility of direct impacts to plants from recreationists (fishermen trailing the stream for access). Livestock grazing has been relatively heavy on these plants, especially on the plants furthest downstream, as well as on other equally palatable willow species (S. monticola). This location is fenced to connect different pastures with gates, and consequently the area gets more use. Beaver and elk also impact this area. Sedimentation from roads, parking areas, and unstable streambanks. An old railroad bed crossing the stream with one large culvert, as well as the present road (SR 273) crossing on an old narrow bridge both affect flood flows by constricting and accelerating flows, and backing water up behind the structures due to inadequate capacity. Longer periods of flooding can drown out shrubby vegetation. The small population size of this area is also a concern.

Recent past conservation actions: Stocking rates and duration have been reduced for this pasture in recent years. This allotment is permitted for 503 head of cattle 5/16-10/31. In 1993 this pasture was used for 18 days by 202 cows and calves, 6/16-7/03 (18 days, 160 AUMS). In 1994 this pasture was used for 22 days by 430 cows and yearlings, and 29 bulls from 8/6-8/28 (22 days, 347 AUMS). Livestock are regularly herded from the Sheeps Crossing area.

Proposed conservation actions

Short term: Place cages around all known plants prior to livestock use in this pasture in 1995.

Estimated Cost: \$400 FY95 Cage installation

Long term: Complete a new AMP for the Greer Allotment by 10/96 which will establish livestock management guidelines for approximately 10 years. Through the Little Colorado Ecosystem analysis, identify measures to reduce recreational impacts. Explore options for relocating roads and parking area. Complete a plan for this area by 10/96.

Estimated Costs: \$500 FY95 and 96 LCEU planning effort
\$200/yr monitoring

Monitoring: All plants will be monitored annually according to the established protocol. First available monitoring and inventory information of this area is from Galeano-Popp's survey completed in 1988.

Site: Population No. 5, above Lee Valley Reservoir.

Location: Lee Valley Creek; north fork upstream of reservoir.

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 2 (Popp "88) **Number of plant units mapped** 1 (1994)

Last visited: summer of 1994 (July 31)

Habitat Acres: **Occupied:** 41 sq ft (Popp "88), 7.32 sq ft 1994 census.
One of the two original plants was not found in 1994.
Potential: 20 ft wide X 4020 ft (0.76 mi) = 1.85 ac
Riparian: 60 ft X 4020 ft (0.76 mi) = 5.54 ac

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: This area is in the headwaters of Lee Valley Creek, and now drains into Lee Valley Reservoir. The plant which has been caged is located near a fork in the drainage, above the reservoir. This area receives high use by elk, and in the past may have been used by beaver. Popp mentions this area as having potential for population expansion. Channel gradients are generally low, and flows are ephemeral. Surrounding vegetation is in the late seral stage of vegetative succession.

Grazing Allotment Voigt **Elk Herd Unit** Greer
Livestock Management Unit Lee Valley Pasture within Wilderness

Site specific concerns: Accumulation of sediments and type conversion from fluvially driven riparian ecosystem towards low gradient wetland types typified by anaerobic conditions. Elk have had impacts on some larger riparian shrubs through antler rubbing. Elk and livestock have had browsing impacts to this area in the past. The small population size of this site is also of concern.

Recent past conservation actions: The Lee Valley grazing management unit was rested from livestock use in 1993 and 1994. One of the two plants Popp found was caged (1986?) and remains so to date.

Proposed conservation actions

Short term: Rest the Lee Valley Pasture from livestock use while the new AMP is being developed.

Estimated Cost: -0-

Long term: Complete a new AMP for the Voigt Allotment by 10/96 which will establish livestock management guidelines for approximately 10 years.

Estimated Costs: \$500 FY95 and 96 LCEU planning efforts, \$200/yr monitoring

Monitoring: All plants will be monitored annually according to the established protocol. First available monitoring and inventory information of this area was made possible through Galeano-Popp's survey completed in 1988.

Site: Population No. 6, Lee Valley Reservoir to Colter Reservoir.

Location: Lee Valley Creek; downstream from Lee Valley dam to Colter Reservoir

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 21 (Popp "88) **Number plant units mapped** 9 (1994)

The 1994 census combined plants which were initially considered separate. Some may not have been found.

Last visited: summer of 1994 (June and July).

Habitat Acres: **Occupied:** 514 sq ft (Popp "88), 119.94 sq ft 1994 census

Potential: 30 ft wide X 0.83 mi = 3.02 ac

Riparian: 250 ft wide X 0.83 mi = 25.15 ac

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: The plants in this population are healthy but have been severely browsed in the past. Many are in a low growth form, growing among dense sedges and bluegrass. Competition from other vegetation is severe and upper portions of this segment and may be too shaded from trees to be considered habitat. Most of the riparian shrubs of all species (especially Bebb's willows) seem stunted, not only from past grazing but likely from an extremely high water table. Twig elongation is very limited. The portion upstream of SR 273 is considered the best habitat, while downstream the gradient is too flat and boggy to be good habitat. Currently, no riparian shrubs are found downstream of SR 273 to Colter Reservoir.

Grazing Allotment Voigt **Elk Herd Unit** Greer

Livestock Management Unit Home Pasture

Site specific concerns: This segment of Lee Valley Creek has been drastically altered through dam construction and reconstruction. Initially, when Lee Valley Dam was constructed, the overflow during high flows, such as during snowmelt, was all directed down the original creek bed. Later, the dam was raised and the spillway no longer directs high flows into this creek bed, but rather has removed the flows to another drainage to the north which spills into the West Fork of the Little Colorado, instead of the East Fork. This confluence is where Colter Reservoir (not currently used) is located. As a result, the only flows which this creek bed currently receives is the leakage from the base of Lee Valley Dam; a constant but low flow. The vegetation types below the dam are slowly type converting towards a wetland, rather than a fluvially driven riparian shrub community. Soils which were originally quite open and permeable are increasing in organic and mineral fines conducive to anaerobic conditions. This

may have an impact to all riparian shrubs, including Arizona willow. The stream channel below the dam, all the way to Colter Reservoir, is currently becoming overgrown with sedges, as flows are not sufficient to maintain the channel. In order to restore this section of creek, it is highly recommended to reconstruct the current spillway of Lee Valley Dam to empty into the original channel. This will be no minor project due to elevational difference between the lake and the stream channel, making energy dissipators necessary. Other threats in this area include grazing by livestock and elk. In the past, uprooted plants have been found in this area. Caging these plants will alleviate this problem. Trespass livestock have been a problem. Small population size is also of concern.

Recent past conservation actions: The Home Unit was rested from livestock grazing in 1993. Livestock grazing was limited to 27% of the permitted numbers in 1994. This pasture was used in conjunction with the adjacent Bull pasture by 80 head of cows and yearlings; 7/21-8/9 (19 days) and 10/1-10/12 (11 days) for 51 AUMS.

Proposed conservation actions

Short term: Place cages around all known plants prior to livestock use in this unit in 1995. Preliminary fencing alternatives involve relocating the pasture division fence on the northeast side of the 273 road. The Forest recommends waiting for the completion of the AMP prior to initiating any significant fence relocation. Electric fencing of existing populations of Arizona willow along the old stream below Lee Valley reservoir will be accomplished as an interim measure. Caging the plants will provide protection for all the plants in this population from cattle and elk.

Estimated Cost: \$1300 FY95 New Fencing

Long term: Complete a new AMP for the Voigt Allotment by 10/96 which will establish livestock management guidelines for approximately 10 years.

Estimated Costs: \$500 FY95 and 96 LCEU planning efforts
\$200/yr monitoring

Monitoring: All plants will be monitored annually according to the established protocol. First available monitoring and inventory information is from Galeano-Popp's survey completed in 1988.

Site: Population No. 7, Voigt Cabin.

Location: Voigt Cabin area, small spring drainage in front of cabin. Arizona willow is located downstream of the cabin.

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 1 (Popp "88) **Number of plant units mapped** 2 (1994)
Another plant was recently found in this vicinity near some spruce, yet to be mapped.

Last visited: throughout the summer and fall of 1994.

Habitat Acres: **Occupied:** 1800 sq ft (Popp "88) all one area.
Potential: 50 ft wide X 1600 ft length = 1.84 ac
Riparian: 250 ft X 2500 ft = 14.35 ac

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: This cluster of plants is located on top of a spring which does not directly surface, but ground water is very near the surface making it spongy in places. In the past (1987), this site was severely affected by rust, killing much of the top growth. Since then, the plant is resprouting, but the leader lengths produced each year is quite short. Rodents also inhabit this cluster, and some leaders are nipped during winter, tunneling through the snowpack. Large ungulate grazing is not an apparent impact, although elk sign, including rubbing of large Geyers willows is evident in the area. Recent livestock use within the pasture has been limited to two horses. Upstream of the cabin the drainage seems to be spreading, saturating the ground in a wide band. The spruce in this area show substantial stress and stunting; many are drowning out. The spring area above the road was thoroughly investigated with a soil pit, and was found to be highly anaerobic.

Grazing Allotment Voigt **Elk Herd Unit** Greer
Livestock Management Unit Little Horse Pasture

Site specific concerns: Threats in this area include rust, rodent herbivory, some elk herbivory, a high water table with resulting anaerobic conditions, competition from surrounding dense grass and sedge meadow vegetation. This site may be conducive to experimentation with prescribed fire, as the willow patch itself is always wet and not in danger. The small population size is also of concern.

Recent past conservation actions: The Little Horse Pasture was to be rested from livestock use in 1993 and 1994, but received some limited trespass use.

Proposed conservation actions

Short term: Place a cage around the single small plant adjacent to Forest Road 273. Enclose the large hedge of Arizona willow with a protection fence. Complete these actions prior to livestock use in this unit in 1995.

Estimated Cost: \$450 FY95 Cage installation

Long term: Complete a new AMP for the Voigt Allotment by 10/96 which will establish livestock management guidelines for approximately 10 years.

Estimated Costs: \$500 FY95 and 96 LCEU planning efforts
\$200/yr monitoring

Monitoring: All plants will be monitored annually according to the established protocol. The first inventory and monitoring information of this area is from Galeano-Popp's survey completed in 1988.

Site: Population No. 8, South Tributary to East Fork of the Little Colorado River above Phelps.

Location: East Fork of the Little Colorado River; south fork in meadow upstream from Phelps Botanical Area, and directly upstream of an old breached dam.

Land Ownership: Apache-Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 28 (Popp "88) **Number of plant units mapped** 63 (1994)

This area, especially a small trickling tributary from the east, has revealed substantially greater numbers of plants than originally found by Popp in 1987. It is not known whether these plants were simply missed, were severely suppressed by herbivory and are now resprouting, or whether some of these could perhaps be seedlings.

Last visited: throughout the summer and fall of 1994.

Habitat Acres: **Occupied:** 169.3 sq ft (Popp "88), 46.26 sq ft 1994 census
1994 data appears incomplete, results not comparable.

Potential: 30 ft wide X 3168 ft length = 2.18 ac

Riparian: 500 ft X 2000 ft = 22.96 ac approx

This approximates the entire wet meadow area.

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: This population has the lowest mean plant height of all sites on the Forest, and consists mostly of plants which grow in marginal saturated conditions as well as a few in rocky soils well away from the drainage. Some plants appear stunted simply from repeated grazing which gives them a hedged growthform. These are often found underneath protective plants such as spruce or shrubby cinquefoil. This entire area is located in the very top of its watershed, and flood flows or overbank flooding does not happen. The area gets ample moisture, but hydraulic gradients in this area are conducive to forming wet meadow vegetation rather than riparian shrub communities.

Grazing Allotment Voigt **Elk Herd Unit** Greer
Livestock Management Unit Phelps Pasture all inside Wilderness

Site specific concerns: The greatest threats in this locality result from saturation and resulting anaerobic conditions conducive to wet meadow formation. Competition from surrounding vegetation is severe. Rodents have been documented in the past to have decimated several plants which were caged. In the past, grazing was relatively severe, with both livestock and elk using the area. Livestock no longer use this pasture. Elk sign is prominent in the area, and browsing

of Arizona willow occurs primarily in the fall. Frost damage has been noted in this population, as well as signs of rust or fungal infection, but these are not major impacts. Sediment is accumulated across the entire width of this meadow, and soil conditions are commonly found to be anoxic in saturated areas.

Recent past conservation actions: The Phelps Unit was rested from livestock use in 1993 and 1994. In the past (1986?) several plants were caged in this population. These were extirpated by rodents concentrating their activity inside the cage.

Proposed conservation actions

Short term: Continue to rest the Phelps Unit from livestock use while the new AMP is being developed.

Estimated Cost: -0-

Long term: Complete a new AMP for the Voigt Allotment by 10/96 which will establish livestock management guidelines for approximately 10 years.

Estimated Costs: \$500 FY95 and 96 LCEU planning efforts
\$200/yr monitoring

Monitoring: Five plants distributed throughout the population will be monitored annually according to the established protocol. First available monitoring and inventory information is from Galeano-Popp's survey completed in 1988.

Site: Population No. 9, East Fork of the Little Colorado River above Phelps.

Location: Main stem of the East Fork of the Little Colorado River upstream from Phelps Botanical Area, all inside the Wilderness boundary.

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 95 (Popp "88) **Number of plant units mapped** 75 (1994)
Difference due to inventory techniques and definition of "Plant Unit."

Last visited: throughout the summer and fall of 1994.

Habitat Acres: **Occupied:** 1233.3 sq ft (Popp "88)
Potential: 30 ft wide X 2.00 mi = 7.27 ac
Riparian: 245 ft X 1.61 mi = 47.81 ac approx

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: The habitat in this stream segment is highly variable; small portions are considered having high potential, while most of the area consists of a low gradient swampy wet meadow where anaerobic conditions prevail. Other willows (Bebbs and Geyers) also seem to be on the decline in this stretch. Most of the Arizona willow in this area is of a low growth form, and competition from surrounding vegetation is severe. Sedges, Kentucky bluegrass, and hairgrass form dense mats. Reduction of Kentucky bluegrass and recovery of this rather large area will be difficult as it lies entirely within Wilderness, and mechanical work is restricted. A few plants of this population inhabit rocky sections of higher gradient stream, with approximately 50% canopy cover of spruce and fir. These inhabit well drained soils.

Grazing Allotment Voigt **Elk Herd Unit** Greer
Livestock Management Unit Phelps Pasture all inside Wilderness

Site specific concerns: The dominant portion of this population seems to be growing in less than optimal habitat with the water table near the surface. An old breached dam is found within this population, which significantly alters the hydrology and extent of soil saturation directly upstream. Wet meadow vegetation is becoming dominant, and in places the stream channel becomes totally choked with sedges. Organic sediments and fines restrict aeration of the root zone. Grazing, in the past two years has been restricted to elk use which is in the fall. In the past, livestock grazing has also impacted some of the plants. Recreation has had some limited impact on this population in areas where the stream can be fished. Most of the area is wet meadow and not impacted by recreationists.

Recent past conservation actions: The Phelps Unit was rested from livestock use in 1993 and 1994.

Proposed conservation actions

Short term: Continue to rest the Phelps Pasture from livestock use while the new AMP is being developed.

Estimated Cost: -0-

Long term: Complete a new AMP for the Voigt Allotment by 10/96 which will establish livestock management guidelines for approximately 10 years.

Estimated Costs: \$500 FY95 and 96 LCEU planning efforts
\$200/yr monitoring

Monitoring: Ten to twenty plants distributed throughout the population will be monitored annually according to the established protocol. First available monitoring and inventory information is available from Galeano-Popp's survey completed in 1988.

Site: Population No. 10, Phelps Botanic Area.

Location: East Fork of the Little Colorado River; all within the Phelps Botanical Area. Most of the Phelps Botanic Area is outside of Wilderness (90%).

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 74 (Popp"88) **Number of plant units mapped** 80 (1994)

Last visited: throughout the summer and fall of 1994.

Habitat Acres: **Occupied:** 4279 sq ft (Popp 1988), 7621 sq ft 1994 census.

Potential: 180 ft wide X 2135 ft length = 8.82 ac

Riparian: 375 ft X 2135 ft = 18.38 ac

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: This population is among the healthiest on the Forest. Plant density and average plant height are the highest of all populations, and general habitat conditions are near excellent. However, even with good habitat conditions, seedlings have not been found within the exclosure. This area has in the past been hit by rust quite heavily, but apparently none of the plants have succumbed. Evidence of top kill is still visible with numerous dead twigs. Plants hit the hardest seem to be those growing in swampy conditions. This population has some limited beaver activity, and pond area seems to slowly be increasing. Beaver foraging on willows is limited and not deemed excessive at this time.

Grazing Allotment Voigt **Elk Herd Unit** Greer
Livestock Management Unit Phelps Botanic Area (livestock exclosure)

Site specific concerns: Rust infection, beaver activities, trailing along streamside by fishing recreationists, elk herbivory, high water tables in portions of area, are the dominant influencing factors.

Recent past conservation actions: The fence around the botanical area has been repaired the last few years to prevent unplanned livestock use. Fence maintenance is an annual problem.

Proposed conservation actions

Short term: Continue to maintain the existing fence around the botanical area annually prior to livestock entering an adjacent unit.

Estimated Cost: \$500/yr fence maintenance

Long term: Complete a new AMP for the Voigt Allotment by 10/96 which will establish livestock management guidelines for approximately 10 years. As part of this planning process, evaluate the boundaries of the Research Natural Area and the need for fencing and alternative locations. This may include enlarging the fenced area to include habitat down to SR 273.

Estimated Costs: \$500 FY95 and 96 LCEU planning efforts, \$200/yr monitoring

Monitoring: Ten to twenty plants distributed throughout the population will be monitored annually according to the established protocol. First available inventory and monitoring is from Galeano-Popp's survey completed in 1988.

Site: Population No. 11, East Fork of the Little Colorado River below Phelps to Colter Reservoir.

Location: East Fork of the Little Colorado River; downstream from Phelps Botanical Area to Colter Reservoir.

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 62 (Popp"88) **Number of plant units mapped** 41 (1994)

Last visited: throughout the summer and fall of 1994

Habitat Acres: **Occupied:** 1623 sq ft (Popp 1988), 2442 sq ft 1994 census.
Potential: 100 ft wide X 0.76 mi = 9.21 ac
Riparian: 150 ft X 0.76 mi = 13.82 ac

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: This stream segment supports a relatively large population with good plant height. The mean plant height decreases with the deterioration of habitat nearer Colter reservoir. Near the Phelps Botanic Area most plants are still quite healthy and form tall bushes, whereas near the reservoir plants are hedged or low and spreading among grasses and sedges. Stream gradient does not significantly change along this stretch of stream, and watertable is near the same depth throughout. Competition from surrounding vegetation (grasses and sedges) is high and may affect seedling success. The existing plants have potential for good improvement after they are fenced.

Grazing Allotment Voigt **Elk Herd Unit** Greer
Livestock Management Unit Big Horse Pasture (outside Wilderness)

Site specific concerns: Unstable stream banks, elk and livestock herbivory, and competition from surrounding vegetation are the dominant influencing factors. This area gets relatively little fishing and recreation use. A limited amount of beaver activity is found in the area, and sediment deposition may be a concern.

Recent past conservation actions: The Big Horse Unit was rested from livestock use in 1993 and 1994.

Proposed conservation actions

Short term: Place cages around all known plants prior to livestock use in this pasture in 1995, or rest the Big Horse Pasture from livestock use while the new AMP is being developed.

Estimated Cost: \$3600 FY95 Cage installation / or rest pasture

Long term: Complete a new AMP for the Voigt Allotment by 10/96 which will establish livestock management guidelines for approximately 10 years. As part of this planning process, evaluate the boundaries of the Research Natural Area and the need for fencing. Evaluate the option of including a portion of this population in the Phelps Botanical Area.

Estimated Costs: \$500 FY95 and 96 LCEU planning efforts
\$200/yr monitoring

Monitoring: Ten to twenty plants distributed throughout the population will be monitored annually according to the established protocol. The first available monitoring and inventory information is available from Galeano-Popp's survey completed in 1988.

Site: Population No. 12, East Fork of the Little Colorado River below Colter Dam.

Location: East Fork of the Little Colorado River; downstream from Colter Reservoir.

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 12 (Popp "88) **Number of plant units mapped** 22 (1994)

Last visited: throughout the summer and fall of 1994

Habitat Acres: **Occupied:** 143.3 sq ft (Popp 1988), 278 sq ft 1994 census

Potential: 30 ft wide X 2.57 mi = 9.35 ac

Riparian: 130 ft X 2.57 mi = 40.50 ac

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: This long reach of stream consists of variable habitat conditions. Arizona willow occurs in relatively low numbers, but is quite healthy. This may indicate good potential for re-establishment efforts. This area consists of a confined valley and the annual floodplain has been observed flooded after/during snowmelt nearly every year. Further downstream the canyon wall confines flows to limit total width of the riparian area, and maintains flow velocity quite well. This likely results in good habitat conditions, maintained over time. Some of the area needs improvement regarding grazing management, and involves two allotments.

Grazing Allotment Voigt/Pool Corral **Elk Herd Unit** Greer

Livestock Management Unit Home, Fobes/Lower Pastures

Site specific concerns: This area has in the past been grazed quite heavily. Livestock have always concentrated in the narrow riparian bottom below Colter Reservoir, and elk use has also been evident in this area. Recreation use is evident with some trailing by fishermen. Competition from surrounding vegetation is also heavy, but annual flooding does create some amount of fresh sediment in limited places. A small two-track road crossing below the dam needs hardening work or closing the road entirely. The small population size is also of concern.

Recent past conservation actions: The Home and Fobes Units were rested from livestock use in 1993. Livestock use in 1994 was limited to 27% of permitted numbers in these two units. Six plants have been caged to protect them from ungulate use. Significant improvement in the vigor of these plants has occurred. The Home pasture was grazed in conjunction with the Bull pasture and managed a single unit, 80 head of cows and yearlings 7/21-8/9 and 10/1-10/12 (see population #6 also). The Fobes pasture was grazed by 80 head of cows and yearlings 7/21-8/9 (19 days) and 9/5-9/30 (25 days) for a total of 117 AUMS. The plant population on the Pool

Corral Allotment is located on a bench just before the EFLCR enters a canyon reach. This plant unit was previously fenced into a small pasture. The fence was removed in 1994 and this unit was included into the Pool Knoll pasture to avoid concentrations of livestock. This unit was not grazed as a scheduled pasture in 1994 as the fence was removed after the cattle were rotated in the grazing schedule, however the unit was used as an overnight holding pasture in early June.

Proposed conservation actions

Short term: Place cages around all known plants that have not already been caged prior to livestock use in these three pastures in 1995.

Estimated Cost: \$500 FY95 Cage installations

Long term: Complete a new AMP for the Voigt Allotment by 10/96 which will establish livestock management guidelines for approximately 10 years.

Estimated Costs: \$500 FY95 and 96 LCEU planning efforts
\$200/yr monitoring

Monitoring: All plants will be monitored annually according to the established protocol. The first monitoring and inventory information is from Galeano-Popp's survey completed in 1988.

Site: Population No. 13, Thompson Ranch.

Location: West Fork of the Black River at Thompson Ranch. Most of this habitat is located on private land.

Land Ownership: most of this area is private land, but a small portion of occupied habitat is located on the Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 3 (Popp"88) **Number of plant units mapped** 4 (1994)

Last visited: throughout the summer and fall of 1994.

Habitat Acres: **Occupied:** 84.7 sq ft (Popp 1988), 76 sq ft 1994 census

Potential: 30 ft wide X 2.38 mi = 8.65 ac

Riparian: 500 ft X 2.38 mi = 144.24 ac

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: This site is overall in good condition, but has had considerable use in the past. It has been managed as part of the Reservation Pasture, and the private land has not been fenced off in the past. Currently, boundary fences are down. The plants in this area are in fair condition, and would strongly benefit from protection. Competition from competing vegetation is evident, with sedges growing up over existing plants. Little bare soil is left for seedling establishment. Wildlife use this area extensively, and include beaver activity and elk grazing. This area has good potential for re-establishment from the hydrologic and soil condition standpoint. The West Fork of the Black River has considerable flow, and a sizable watershed behind it to keep flooding and scouring in this area relatively natural. The FR 116 road crossing could use improvement to include culverts on the floodplain designed to handle part of the flood flows.

Grazing Allotment Burro Creek/Private Land **Elk Herd Unit** Black River
Livestock Management Unit Reservation Pasture

Site specific concerns: Beaver activity, unstable stream banks, elk and livestock herbivory, dense competing vegetation, high water tables. The road crossing of FR 116 could use improvement to better handle flood flows on the floodplain. Currently, one pipe handles all flows, backing up a sizable pool when at capacity. Unstable stream banks and sedimentation from road crossings contribute some sediment. Off-road vehicles, heavy recreational fishing and camping also impact the area heavily. Small population size is also considered a major concern.

Recent past conservation actions: A new AMP has been developed for the Burro Creek Allotment (approved 9/30/93). Fifty log/boulder bank stabilization structures have been installed

for Apache trout habitat. Planting of various willow species has also been undertaken. The impact of these actions to Arizona willow is unknown. Two miles of road adjacent to the stream has been closed to reduce sedimentation and impacts to the riparian area from recreational use. Two miles of livestock management fence was constructed to prevent unplanned livestock use as a result of drift from an adjacent unit. The AMP calls for the construction of a livestock management fence which will split the Reservation Unit, creating the Thompson Unit which will serve to isolate this population into a separate riparian management unit. This will allow for reducing the duration of grazing in this area to approximately 15 days. A cattleguard needed to complete this fence was installed in 1994. The Forest continues to work with the private landowners on exchange opportunities to bring the Thompson Ranch private lands into the National Forest system.

Proposed conservation actions

Short term: Enclose the four known plants with fences to protect them from cattle and elk prior to use of this unit by livestock in 1995. Install additional stream bank stabilization structures during 1995. Complete construction of the livestock management fence (1.3 miles) to create the Thompson riparian management unit by October 1995.

Estimated Cost: \$7000 FY95 Cages and New Fencing

Long term: Continue to implement the Burro Creek AMP and monitor riparian/stream conditions.

Estimated Costs: \$200/yr monitoring

Monitoring: All plants will be monitored annually according to the established protocol. The first available monitoring and inventory information is available from Galeano-Popp's survey completed in 1988.

Site: Population No. 14, below Thompson Ranch.

Location: West Fork of the Black River downstream from Thompson Ranch

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 8 (Popp"88) **Number of plant units mapped** 8 (1994)

Last visited: throughout the summer and fall of 1994

Habitat Acres: **Occupied:** 88.7 sq ft (Popp 1988), 146 sq ft 1994 census

Potential: 30 ft wide X 2.26 mi = 8.22 ac

Riparian: 100 ft X 2.26 mi = 27.39 ac

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: This population is strung out into approximately three locations over the whole reach. The plants are found in areas having formed benches or floodplains within the canyon. The total number of plant units found in this area is low, but plants are in good condition. This canyon receives fairly little ungulate use, and beaver activity is of little consequence. The area is suited for reintroduction of the willow due to low impacts from threats and near optimal habitat conditions resulting from unaltered flows of the West Fork of the Black River.

Grazing Allotment Burro Creek **Elk Herd Unit** Black River
Livestock Management Unit Reservation Pasture

Site specific concerns: Unstable stream banks, low beaver activity (foraging and flooding), limited elk and livestock herbivory within the entire canyon, competing vegetation, recreationists trailing along stream for fishing access, roads and off-road vehicles are all of concern.

Recent past conservation actions: A new AMP has been developed for the Burro Creek Allotment (approved 9/30/93). Twenty five log/boulder bank stabilization structures have been installed for Apache trout. The potential impact of these actions to Arizona willow is unknown. Three miles of road adjacent to the stream has been closed to the public to reduce sedimentation and impacts to the riparian area from recreational use. Fill material where an old railroad bed crossed the stream has been removed to restore the floodplain to a more natural condition.

Proposed conservation actions

Short term: Enclose the all known plants with fences to protect them from cattle and elk prior to use of this unit by livestock in 1995. The AMP calls for the construction of a livestock management fence which will further split the Reservation Unit, creating the West

Fork Unit which will serve to isolate this population into a separate riparian management unit. This will allow for reducing the duration of grazing in this area to approximately 20 days. This new fence (2.7 miles) will be completed by October 1995.

Estimated Cost: \$13,650 FY 95 Cages and New Fencing

Long term: Continue to implement the Burro Creek AMP and monitor riparian/stream conditions. Install additional bank stabilization structures along the West Fork of the Black River within the next three years. Add two extra culverts at the FR 116 road crossing of the West Fork of the Black River, to allow better passage of high flows on the floodplain instead of concentrating flows within the existing channel. These new culverts would normally be dry.

Estimated Costs: \$200/yr monitoring

Monitoring: All plants will be monitored annually according to the established protocol. The first available monitoring and inventory information is available from Galeano-Popp's survey completed in 1988.

Site: Population No. 15, Stinky Creek.

Location: Stinky Creek, a tributary to the West Fork of the Black River.

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 3 (Popp"88) **Number of plant units mapped** 3 (1994)

Last visited: throughout the summer and fall of 1994.

Habitat Acres: **Occupied:** 27.5 sq ft (Popp 1988), 14.3 sq ft 1994 census.

Potential: 30 ft wide X 1.81 mi length = 6.58 ac

Riparian: 120 ft X 1.81 mi length = 26.33 ac

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: This population is located all in one area of generally good condition habitat. Stinky Creek goes dry in the upper half of the stream during the summer, but the lower half maintains some flow. The plants are located approximately halfway down the creek where flows are maintained. Ungulate grazing has been fairly light in this canyon in the recent past, and the plants do not get significant use. The size of this watershed is not extensive, and judging from stream condition, this drainage has not experienced significantly variable flows within the near past. The good habitat conditions in this drainage may allow for successful regeneration efforts.

Grazing Allotment Burro Creek **Elk Herd Unit** Black River
Livestock Management Unit Reservation Pasture

Site specific concerns: Dense competing vegetation, lack of water in drainage during low flow periods, limited herbivory from livestock and elk, sedimentation from adjacent road drainage, sections of stream with low gradient which are turning into wet meadow vegetation (Geyers willows are on the demise and also forming dwarf growth forms due to high water tables). The extremely small population size is also considered a concern to long-term viability.

Recent past conservation actions: A new AMP has been completed for the Burro Creek Allotment (approved 9/30/93). Approximately 0.7 miles of road alongside Stinky Creek was obliterated to reduce erosion and sedimentation. This section of road was a significant sediment source. Another three miles of road has been closed to the public to reduce sedimentation and impacts to the riparian area from recreational use. The AMP called for constructing two exclosures on meadow reaches of Stinky Creek. The fence (2.1 miles) for the lower exclosure was completed in 1994. This fence serves to exclude cattle from 1.0 miles of potential Arizona willow habitat.

Paired exclosures were planned for an upper reach of Stinky Creek. An elk/cattle study fence is planned for half of this meadow. This fence will enclose the three known plant units. A cattle exclosure fence was planned for the other half of this meadow reach for comparison purposes. The cattle exclosure portion of this upper meadow fencing project was completed in 1994. Work on the elk/cattle portion was initiated. These paired exclosures would be a possible site for proposed studies relative to ungulate use and regeneration of Arizona willow.

Proposed conservation actions

Short term: Complete the elk/cattle exclosure fence to protect the known plants from browsing prior to use of this unit by livestock in 1995.

The AMP also called for isolating Stinky Creek into a separate riparian management unit to reduce the duration of grazing to approximately 20 days. This will be accomplished with the same fence (2.7 miles) discussed for Population No. 14 above which is scheduled for completion by October 1995.

Estimated Cost: \$5000 FY95 elk/livestock exclosure installation

Long term: Continue to implement the Burro Creek AMP and monitor riparian/stream conditions. Harden road crossings to reduce erosion and sedimentation. Complete within three years.

Estimated Costs: \$500/yr monitoring and maintenance of exclosure

Monitoring: All plants will be monitored annually according to the established protocol. The first available monitoring and inventory information for this area is available from Galeano-Popp's survey completed in 1988.

Total Cost of Short Term Actions: \$32,750

PART IV

**ARIZONA WILLOW
CONSERVATION STRATEGIES BY
MANAGEMENT AGENCY**

**C. Dixie and Fishlake National Forests
and Cedar Breaks National Monument**

ARIZONA WILLOW CONSERVATION STRATEGY DIXIE AND FISHLAKE NATIONAL FORESTS AND CEDAR BREAKS NATIONAL MONUMENT

Ron L. Rodriguez¹, Robert B. Campbell², and Duane Atwood³
March 1995

I. INTRODUCTION

Populations of Arizona willow discovered in Utah during the 1994 field season add significant "new" data on the species distribution and status. Inventories of potential habitat in Utah over the next several years will add additional information. The species and its habitat in Arizona are currently on a strong downward trend while many of the Utah populations appear to be stable. A more detailed review of the species' ecology and relationships in riparian communities is currently underway for populations on both the Dixie and Fishlake National Forests (NF).

These unique riparian areas have received heavy recreation and range uses and have faced significant conservation problems in the absence of conservation planning. Arizona willow habitats are associated with or are adjacent to old growth spruce/fir forests and are being impacted by timber harvesting and encroachment of trees into riparian areas. Limited research on the species makes its habitat vulnerable to current management programs. Current forest management practices in some areas in Utah (East Fork of the Sevier River, CCC Camp, and Seven Mile drainage) are not compatible with maintenance of quality habitats. Furthermore, the population biology and management of the species requires across-region and interagency planning to facilitate effective conservation planning and management.

The Utah populations of Arizona willow (*Salix arizonica* Dorn) occur on both volcanic and sedimentary soils and are in dense clones or stands in some populations. For the most part they appear to be more healthy than the Arizona populations. Management of the genetic diversity in these disjunct populations of Utah and Arizona will be an important component of the conservation strategy for the species. While our understanding of this willow's ecology, biology, and management needs are insufficient to produce a conclusive assessment and strategy, this document provides our best effort based on the available data.

The success of this effort goes beyond the conservation of the Arizona willow. This strategy and its implementation is "breaking New Ground" in our cooperation to conserve species. This effort will serve as a "blueprint" for conservation of other species and ecosystems. It also serves as a major accomplishment implementing the intent of the recently signed National prelisting Memorandum of Understanding for species conservation.

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II. CONSERVATION STRATEGY

A. Goals

The primary goal of this document is to provide direction that will lead to long-term management and protection of Arizona willow and its associated ecosystems while minimizing conflict with other resource values and land management activities. Implementation of specific actions to remove threats will ensure that activities on public lands will not contribute to the loss of essential habitat or species viability.

To achieve the above goals, the following site specific objectives have been identified. If these objectives are met, management of Arizona willow and its population will meet the stated goals.

1. Determine the life history and biological needs to maintain or improve population viability of Arizona willow.
2. Complete surveys within high priority potential habitat in Utah within the next 2-3 years.
3. Manage and/or restore Arizona willow riparian ecosystems to achieve a healthy balance of ecological stages.
4. Implement specific actions to remove threats to ensure species viability throughout its range.
5. Monitor unique populations to determine current trends and the effectiveness of management strategies in maintaining or improving species viability of the species.
6. Revise land management plans and incorporate the conservation strategy into Land and Resource Management Plans to ensure that budgets are programmed to provide for implementation.

B. Objectives

1. **Determine the life history and biological needs to maintain or improve population viability of Arizona willow.**

There are several aspects of the life history and biological needs of Arizona willow that need to be studied. These include seed set, viability and longevity, genetic variability within and between populations and pollinator biology, and density. In addition, several populations should be protected from grazing using exclosures to study demographics and plant longevity.

2. Complete surveys within potential habitat in Utah over the next 2-3 years.

Surveys of potential habitat should be completed throughout Utah within the next 2-3 years.

3. Manage and/or restore Arizona willow riparian ecosystems to achieve a healthy balance of ecological stages.

This will involve a variety of management strategies which may include: livestock grazing, wildlife grazing, recreation management, bank stabilization, and vegetative plantings.

Heavy grazing by domestic livestock can change species composition, break down stable banks and lower water tables, all of which negatively impact Arizona willow habitat.

4. Implement specific actions to remove threats to ensure species viability throughout its range.

See tables in Parts I and III.

5. Monitor unique populations to determine current trends and the effectiveness of management strategies in maintaining or improving viability of the species.

A monitoring plan has been prepared in conjunction with this conservation strategy. This plan has been reviewed by experts from U.S. Forest Service, U.S. Fish and Wildlife Service, and universities. When fully implemented, this plan will enable the Forest Service to closely follow population trends and the effectiveness of management on Arizona willow. The monitoring plan is included in appendix x.

6. Revise land management plans and incorporate the conservation strategies into Land and Resource Management Plans (LRMP) to ensure that budgets are programmed to provide for implementation.

Dixie National Forest LRMP - The Forest Plan will be amended to include the conservation strategy for Arizona willow in fiscal year 1996 if needed. It is anticipated that the Forest Plan revision will be completed by ecoregion subsection. At that time, the conservation strategy for the Arizona willow will be included in the Plan revision for the Dixie Subsection. The conservation strategy will also be included in the Plan revision for any other subsection on the Forest where Arizona willow may have been discovered as a result of ongoing inventories.

Fishlake National Forest LRMP - The Forest Plan will be amended to include the conservation strategy for the Arizona willow in Fiscal Year 1996 if needed. It is anticipated that the Forest Plan revision will be completed by ecoregion subsection. At that time, the conservation strategy for the Arizona willow will be included in the Plan revision for the Fishlake Plateau Subsection. The conservation strategy will also be included in the Plan revision for any other subsection on the Forest where Arizona willow may have been discovered as a result of ongoing inventories.

III. BIOLOGICAL AND GEOGRAPHICAL INFORMATION

A. Nomenclature and Description

Arizona willow (*Salix arizonica*) belongs to the family Salicaceae. The species was described by Dr. Robert Dorn in 1975 from Arizona specimens collected by Carl-Eric Granfelt in 1969. The species, in Utah, is generally a shrub up to 4 feet tall in course well drained soils and a much shorter prostrate shrub in the wet, less drained sites. Several forms are manifest based on soils, moisture and grazing impacts. The branches are yellow-green, red-brown, or brownish, villous to pilose, with the previous years growth usually red. The leaves are short-petiolate (3-7.5 mm) with gland-tipped serrate margins (7-21 teeth or glands per cm). The mature blades are elliptic to broadly elliptic, 20-50 x 10-31 mm, 1.6-3.6 times as long as wide with the lower surface non-glaucous, glabrous or pilose, upper leaf surface shiny, pilose or glabrous with a cordate or rounded base; young leaves of the current year's growth are often much larger but still maintain the length x width ratio. The inflorescence is coetaneous with brown, black or bicolor floral bracts 1-2 mm long, with wavy hairs and acute tip. Pistillate (female) catkins are densely flowered, 1-4.5 cm long with glabrous ovaries.

The species occupies wet meadows, stream banks and seep areas between 8,360-10,800 feet elevation on sites with less than 9 percent (%) slope. Flowering occurs primarily from June-July.

B. Status

The current and proposed status is summarized as follows:

FWS: Proposed for listing as Endangered (57 FR 54747)

USFS: Designated as a sensitive species in Region 3 by the Regional Forester. Currently being added to the Region 4 Regional Forester Sensitive Species List.

STATE/Heritage Databases: Utah: S2 G2

C. Geographical Distribution and Population Information

1. Geographical Distribution

Until recently Arizona willow had only been known to occur in the White Mountains of Arizona on the Apache-Sitgreaves NFs the Fort Apache Indian Reservation. In the Arizona populations, all Arizona willow plants have been found in drainages that trend to the north, east, or south. Sometimes, individuals are widely spread (more than one mile apart), but occasionally, plants are clustered. The species is found at elevations above 8,500 feet in wet meadows, stream sides, and open meadows and most commonly in or adjacent to forest edges or meadows with sparse stands of spruce. Plants are also found in drier sites within the riparian zone.

On June 30, 1994, Arizona willow was rediscovered on the Dixie NF in southern Utah (US Forest Service, Intermountain Region, R-4). A population was originally collected in 1913 on the Sevier National Forest (which has been renamed, and is now known as the Dixie NF). The 1913 collection was identified as Black Willow (*Salix pseudomyrsinites* Andes). Nineteen additional populations have been discovered, including one located on August 8, 1994, on the Loa Ranger District of the Fishlake NF.

Based upon three months of field survey data on the Dixie NF, the range of Arizona willow is known within two areas. The first, is 17 populations on the Markagunt Plateau in the vicinity of Brian Head peak. These populations are disjunct in an area approximately 15 air miles across. The second, very small population, located on the Paunsagunt Plateau in the East Fork of the Sevier River drainage. Elevations range from 8,360 to 10,800 feet. Populations were located in wet meadows, along stream sides, and in open meadows. Most commonly, populations were located adjacent to perennial water and in meadows adjacent to forest edges composed of spruce. Plants are also located in drier sites along forested edges. Populations tend to occur in large, dense patches, sometimes occupying several hundred acres. In many areas, Arizona willow is the dominant shrub component. Individuals widely spaced throughout a drainage are rarely found. Plants have been found occupying all aspects, but they primarily trend east, north, or south.

Based on one week of field surveys on the Fishlake NF, the range of Arizona willow is limited to the Seven Mile Creek drainage. This population has been surveyed for approximately four miles along the stream and adjacent meadows and riparian stringers and occupies 151 acres. Arizona willow has been located the entire length of the area surveyed. This population is about six miles north of Fish Lake and lies approximately 105 air miles to the northeast of Brian Head Peak (Figure 5, page 66). Elevations range from 9,200 to

9,400 feet. Populations are located in wet meadows, along Seven Mile Creek, numerous springs and seeps, and in large open meadows. Most commonly, populations were located adjacent to perennial water and in open meadow areas. It was not uncommon to find populations adjacent to forested edges. Some plants were located in drier upland sites along forested edges. Populations tend to occur in large, dense patches, sometimes occupying up to 30 acres in size. Individuals were generally clustered, but occasionally occurred as single individuals spaced throughout a drainage mixed with various other willow species. Plants were found occupying all aspects; however, they primarily trend east, north, or south.

2. Population Information

Dixie National Forest

There are 19 locations of Arizona willow located on the Cedar City and Powell Ranger Districts of the Dixie NF. Additional field work, i.e. surveys, monitoring, research, etc. will continue through the year 2000. These actions are outlined in Parts I and III. Listed below are the names of each population and the number of acres identified.

	acres
1. Brian Head Peak	1
2. Brian Head Town	20
3. Bunker Creek	1
4. CCC Camp	42
5. Castle Creek	6
6. Cedar Breaks	21
7. Crystal Spring	1
8. East Fork Sevier	2
9. East Power Line	37
10. Hancock Peak	24
11. Long Valley	4
12. Lowder Creek	142
13. Midway Face	3
14. Navajo Lake	9
15. Power Line	105
16. Rainbow Meadows	304
17. Reeds Valley	1
18. Sheep Herder Camp	72
19. Sidney Valley	79

Each location has been mapped using a Global Positioning System (GPS), and the exact size calculated in acres. Additional populations located will also be

recorded and entered into the Forest GIS data base. There are approximately 210 acres of Arizona willow that occur on private land, and the remaining 663 acres on Federal lands.

Fishlake National Forest

A large population of Arizona willow (130 acres Forest, 21 acres private) occurs in the Seven Mile Creek drainage on the Loa Ranger District. Because surveys have been limited, the extent of the population is unknown. However, surveys have been completed along four miles of stream and adjacent meadows and riparian stringers. Arizona willow occurs throughout the four mile area surveyed. Additional surveys will be completed in the Seven Mile drainage over the next several years and in other potential habitat areas on the forests along with other actions identified in Tables 1-5.

D. Habitat

Habitat protection is currently in place which will continue to offer protection for selected populations on both the Dixie and Fishlake NFs as scheduled in tables in Parts I and III.

IV. THREATS TO THE SPECIES

Listed below are threats which have been identified that could affect Arizona willow populations or their habitat.

A. Livestock Grazing

Livestock grazing poses great threat to the viability of the species and its habitat. Historic grazing at the level observed during 1994, on some populations, has resulted in habitat degradation, affected species health and vigor and probably loss of individual plants and/or clones. At least one population may be below viable population numbers. Some of the grazing systems currently in place do not offer adequate rest and protection. These populations appear to have low vigor, produce very little annual leader growth or catkin development. Currently the Forest Service is in the process of analyzing and reviewing the reissuance of grazing permits on all the National Forest administered lands.

Range Allotments

Dixie National Forest

Six Lakes Sheep Allotment

The CCC Camp, Long Valley, western portion of Power Line (95%), and Sheep Herder Arizona willow populations occur in this allotment. The National Monument fence along the western and northern part of the CCC Camp population, adjacent to the NF, provides

an artificial L- shaped inclosure for the herder to use the area as a holding/bedding ground. Over the years this has had significant impacts on the vegetation in the area. A distinct fence line contrast exists between the National Monument and NF administered lands. Arizona willow plants on the National Monument are very healthy, are in dense stands, and occur right to the fence boundary. Very few plants occur on adjacent NF lands. The Power Line population has not received any noticeable use by ungulates. The Sheep Herder population has had noticeable use on selected plants indicating a livestock preference for specific plants. Overall use on this population does not appear to be significant. Some of this use may result from holding sheep in the area to long. The herder does camp on the dry slope above the population for a period of time. A shift of camp areas may be a mitigating action needed to remove this impact.

This area has been used exclusively by sheep since southern Utah was settled in 1851. Records show that in 1911, there were 1279 sheep grazing the allotment from 6/16 to 10/31. Cattle were grazed in common with the sheep beginning in 1917. Prior to 1946, coop bands used the range and trading of allotments occurred frequently, from cattle to sheep and sheep to cattle.

Presently there are 1230 sheep using the allotment from 6/21 to 9/25. On the high elevation range where Arizona willow is located the sheep graze from approximately 7/10 to 9/1.

The upper units are grazed under a deferred-rotation system in which the two units are alternately used first. Normally, the grazing schedule is set for 25 days in each unit.

In 1984 when the allotment management plan was revised, it was estimated that range condition on the allotment was improving and 63% of the potential range was in fair condition and 37% in good condition. There are concerns about portions of the Long Valley unit where grazing has been excessive. Plant vigor is low and ground cover is lacking in certain areas to protect the soil. There is hedging of the Arizona willow on the Cedar Breaks south portion.

In the 1995 annual operating plan of use, the number of sheep band days will be reduced in the Long Valley unit to restore plant vigor. The unit will be grazed last to allow the plants to reach seed maturity. Those areas next to Cedar Breaks National Monument will be defined in the annual plan of use as areas with lighter grazing. Utilization cages will be installed to monitor use and see that these standards are met.

Dandelion Knoll Sheep Allotment

Arizona willow populations occur within Hancock Peak, and the eastern portion of Power Line (5%) population. No detectable grazing was observed on the East Power Line or Hancock Peak populations in 1994. Both populations have large healthy robust plants.

The allotment has been exclusively sheep grazing since the establishment of the Forest Service. For many years prior to 1935, the season of use on this allotment was 7/1 to 9/30 for about 1230 sheep. From 1935 to 1940 the season of use was 7/1 to 9/15 and the number was reduced to 995. Since 1940 the season has been adjusted several times to the present season of 7/11 to 8/20 for 1325 sheep months. Current status of the permit is 995 sheep for a 7/11 to 8/20 grazing season.

The allotment is divided into three grazing units; north, south and summit. These units will be used on a deferred-rotation system of grazing. The north and south units will be alternately used first each year. On approximately August 10, the sheep are moved to the summit unit.

Range conditions on the allotment are based on observations of the area during the last few years. According to the range analysis, 55% of the potential range is in fair condition and 45% in good condition. Range trend is estimated to be stable or up.

In the 1995 plan of use, there will be no special provisions for the Arizona willow in rainbow south population.

Brian Head Sheep Allotment

Within the Rainbow Meadows portion of this allotment, approximately 10% in the northern half contains Arizona willow. Sheep graze on the uplands above and adjacent to the Arizona willow stand and apparently do not use the wet areas where Arizona willow occurs. No use was observed on Arizona willows in 1994.

The allotment was used in common with sheep and cattle until 1920. From 1920 to 1926, the preference obligation was 1428 sheep for a season of 7/1 to 9/30. From 1926 to 1946 the preference was adjusted from 1428 sheep and a season of 7/1 to 9/30 to 800 sheep and a season of 7/16 to 9/15.

In 1983, the Brian Head and Haycock Mountain allotments were combined. Permitted number on the Brian Head allotment at that time was 750 sheep for a 7/16 to 9/15 grazing season. On the Haycock Mountain allotment permitted numbers were 817 sheep for a 6/11 to 9/30 grazing season. Between the two allotments permitted numbers were changed to 1000 sheep for a 6/11 to 9/30 grazing season. This resulted in a reduction of the total number of animal months by 828 sheep months.

Current status of the permit is 1000 sheep for a 6/11 to 9/20 grazing season. Brian Head will be grazed from 8/15 to 9/30.

The allotment is grazed under a modified deferred-rotation grazing system. The Haycock Mountain allotment is divided into 3 units, where the sheep graze for approximately 2 months at the beginning of the grazing season. On about August 10 each year, the sheep

are trailed to the Brian Head portion of the allotment. Therefore, Brian Head is deferred until after seed ripe each year.

Based on field observations on the allotment, range conditions have improved and trend is up or stable. It is estimated that 25% of the potential range is in good condition, 69% is in fair condition and 6% is in poor condition.

In the 1995 annual plan of use, there are no special provisions planned for the Arizona willow in the Rainbow north population.

Sidney Valley Cattle Allotment

All of the Lowder Creek population and 20% of the Sidney Valley population occur in the southern portion of the Sidney Valley cattle allotment. Moderate use has occurred on some plants in the Lowder Creek population, with some heavy use on a few selected plants along the outer population margins. Most of the use has been along the margins of the population where the plants are less dense and where cattle trail. This use has mostly occurred below the peat bog and appears to be on selected plants. Most of the plants are 4-6 feet tall in the core area with smaller individuals (1-3 feet high) along the margin of the habitat demonstrating some age class variation or growth response to grazing. Most of the livestock grazing occurs in the lower part of the population. Plants in this area are smaller in stature, are not present throughout the potential habitat area and appear to be less vigorous than those in the upper portion of the drainage.

This allotment was established from the Sidney Valley sheep allotment in 1949. The obligation was 60 cattle for a season of 7/11 to 9/10. This is the present obligation.

From 1920 to 1939 several changes were made in boundaries of this allotment. Some range lands were taken from the allotment about 1935 and added to the Dandelion Knoll Allotment. In 1939 a shift in sections of the allotment boundary was made in connection with creating exclusive range for cattle near Houston Mountain on the Asay Bench Allotment. Some range was added to the Red Desert Allotment.

On June 6, 1947, the Sidney Valley Sheep preference held by the Claude Smith Brothers was waived back to the government and the upper portion known as Upper Sidney Valley was then attached to the Warren sheep Allotment. The allotment was grazed by sheep until 1949. In 1978 the Lowder Creek land exchange were completed and 320 acres in Lowder Creek was added to the Sidney Valley Allotment. Only a small portion of this is potential range.

Current status of the permit is 60 cattle for a 7/11 to 9/20 grazing season.

The allotment is grazed as one unit under a season-long grazing system. Most of the grazing capacity is located in Sidney Valley and near Lowder Creek. Cattle are distributed

according to the available forage. Overall the allotment is considered to be in good condition. According to range analysis data, approximately 80% is classed in good condition and 20% in fair condition.

In the 1995 annual plan of use, the permittee will be informed of the willow population on his allotment and its location. An evaluation will be made before the grazing season to determine the need for installing an electric fence for willow protection as was done last year in the Sidney Valley willow population. A 3 way experimental exclosure has been installed in Lowder Creek to monitor wildlife, livestock uses, an area open to all uses and total protection from all uses. Within Sidney Valley monitoring will occur within the areas where the electric fences have been installed.

Warren-Bunker Sheep Allotment

The Bunker Creek, Castle Creek, and northern part of Sidney Valley contain populations of Arizona willow. The Bunker Creek (1 acre) and Castle Creek (6 acres) populations have received light grazing. This portion of the Sidney Valley population has not been affected by grazing. Apparently sheep frequent the dry areas adjacent to the wet riparian willow habitat. Only light grazing was observed along the margin of the population in 1994.

From the creation of the Forest in 1905 to 1947, many small allotments were consolidated into the present Warren-Bunker allotment. In 1912, the season of use was 6/16 to 10/31. In 1919, there were 1852 sheep permitted on the allotment for a 6/16 to 9/30 grazing season and 65 cattle for a four month grazing season. In 1939, there were 1005 sheep grazing from 7/1 to 9/15. In 1947, upper Sidney Valley was added to the Warren sheep allotment. In 1970 there were 1122 sheep permitted for a 7/6 to 9/20 grazing season. In 1990 sheep numbers were reduced for range protection to 900 sheep.

Current status of the permit is 900 sheep for a 7/6 to 9/20 grazing season.

The allotment is grazed under a deferred-rotation grazing system. The system is designed to delay grazing in each unit until after flowering and seed ripe stage of some forage plants, every other year. Sheep will begin grazing one year in Bunker Creek and the next year in Mammoth Creek.

Range condition on the allotment is considered fair overall. A reduction in sheep numbers was made in 1990 to reduce the grazing impact and try to improve range condition. Trend studies have not been evaluated since that time.

There are no special provisions planned in the annual plan of use on this allotment to protect the Arizona willow in the upper Sidney Valley willow population.

Brian Head Summit sheep trail

Since the first sheep permits were established on the Cedar City Ranger District, sheep bands have trailed up over Mammoth Summit and around the north and east edge of Cedar Breaks National Monument to gain access to their grazing allotment. Presently, there are four bands that use this route twice a season. The Warren-Bunker band and Dandelion Knoll band trail to the east entrance of Cedar Breaks National Monument and then trail down the Panguitch Lake Highway. The Six Lakes and Sage valley bands trail south from the east entrance to Cedar Breaks through the corridor of National Forest land. This trail continues along the entire east boundary of Cedar Breaks.

Small populations of Arizona willow exist on the north edge of Cedar Breaks and the east side of Cedar Breaks. These populations are located in a narrow corridor of National Forest land where the sheep trail. This would be minimally affected in a normal year because sheep trail through the area but do not stop to graze.

The Brian Head Peak Arizona willow population occurs in the Haycock Mountain allotment. This population occupies about 1 acre around a small spring. No grazing impacts have been observed on this population. The Brian Head Town population is in the Navajo Ridge allotment but occurs on private lands not currently grazed by livestock. The Cedar Breaks National Monument populations receive no livestock grazing. The Midway Face population (approximately 3 acres) is in the Sage Valley allotment. Very little, if any, grazing occurs on this population. The Navajo Lake area where Arizona willow occurs is in an unobligated area for grazing. The Reeds Valley population, in the Asay Bench allotment, has had light grazing use by cattle but is not a significant threat to the population.

Robinson Canyon Allotment

The East Fork of the Sevier population is the only known population of Arizona willow in this allotment and on the Powell Ranger District. The East Fork drainage has had a long history of heavy livestock grazing since the pioneers entered the area in the mid to late 1800's. Currently the water table is 2-6 feet below the normal historic level. As a result much of the riparian area has been converted to a dry meadow, sagebrush or rabbitbrush type with lower resource values for riparian dependent species than vegetation communities which have the potential to occupy these sites. Some large dead clumps of willow (probably geyer or booth) occur in these dry areas away from the current riparian area, which documents the riparian area was much broader at one time. Arizona willow was not located in many potential habitat areas searched in this drainage during 1994. If fully implemented, the Management objectives in the current Allotment Management Plan (5/16/94) can provide for restoration of these key riparian areas.

Current status of the permit is 88 cattle (cow/calf) for a 6/16 to 8/20 and 8/01 to 10/5 grazing season using a deferred-rotation grazing system. Two units, Robinson and

Blubber, are grazed annually, with alternating dates of use. An Annual Operating Plan will be developed to prescribe management activities needed for each grazing season. Until range readiness is reached each year, no livestock will be allowed on the allotment.

Fishlake National Forest **Seven Mile Drainage**

The Seven Mile population of Arizona willow is the only known population on the Fishlake NF based on surveys completed in 1994.

The Seven Mile Allotment Management Plan (AMP) was updated in 1986 to meet three primary management objectives: 1) maintain range, ecological and soil condition at fair or better condition with stable or upward trends, 2) improve overall stream habitat condition at or above 70% optimum by 1993, and 3) firm grazing capacity by 1989 and stock to that level.

Grazing utilization in 1994 ranged from 60% to 90% of total forage on both the riparian and uplands (Atwood and Winward pers. comm. 1994). Production potential in the uplands is estimated to be 2,500 pounds of forage per acre. Actual production is estimated to be 900 pounds per acre with 90% of the species present being non-desirable (Atwood Winward personal communication 1994). Thus, desirable annual production is about 90 pounds per acre. Range analysis data collected in 1994 showed the ecological status for the uplands to be in very early and early seral stages. A substantial amount of small mammal activity occurs in the area. Preliminary data indicate some riparian areas are in an early to mid seral stage. The desired future condition would be a mix of all four seral stages represented throughout the drainage.

Historical grazing and fire suppression in this drainage have substantially altered the historical fire patterns reducing the available forage throughout the drainage and placing increased pressure on the remaining forage.

The management prescription identified in the AMP is a deferred rotation system on the summer range where Arizona willow occurs. However, in the 1994 grazing season, 1144 cattle (cow/calf) used the entire Seven Mile drainage area for a 6/29 to 9/2. Herders moved the cattle away from the riparian areas to reduce concentration of cattle in these sensitive areas. The existing AMP is currently undergoing a revision and National Environmental Policy Act (NEPA) review. This process will be completed by the beginning of the 1995 grazing season.

Cedar Breaks National Monument

The Cedar Breaks National Monument (NM) populations, of Arizona willow, occur along the northeast boundary of the monument across from Sunset View. This area is currently grazed by wildlife with no historical records of livestock grazing, other than horses. It is

however very likely that the area was grazed by other species of livestock during the early settlement period of southern Utah. Historically, the area east of Sunset view was used as a Civilian Conservation Camp (CCC). This area contains the largest population of Arizona in the NM. The population within the NM is in good condition and consists of large healthy plants on the western portion in the drier sites and the more dwarf form on the wetter anaerobic sites.

B. Wildlife Grazing

Ungulate Herbivory

Mule deer, Rocky Mountain elk, moose, and pronghorn antelope are the large wild ungulates found within Arizona willow habitat in Utah. Other species which may use, or effect, Arizona willow populations include beaver, and a variety of small animals.

All 19 populations on the Dixie NF occur within occupied mule deer and elk habitat. In addition, the East Fork of the Sevier population occurs within occupied pronghorn antelope habitat. There have been no recorded sightings of moose inhabiting the Dixie NF. The Seven Mile population provides habitat for Rocky Mountain elk, moose, deer, and a variety of small mammals.

Preliminary data collected by research graduate students and field observations by agency personal indicate that little grazing occurs on Arizona willow. Elk numbers are in stable condition and are all within established population herd objectives as stated in approved elk management plans.

Rodent Herbivory

Two of the 20 Arizona willow populations in Utah have recorded beaver activity. The overall extent to which rodent herbivory, in Utah, affects Arizona willow is unknown. Brigham Young University, and agency professionals, will be recording field observations on any use by rodents, especially over the next three years. Herbivory threats by beaver are not a significant impact on Arizona willow since both the Dixie and Fishlake NFs have sufficient quantities of aspen adjacent to willow stands. Very few beaver currently occur in Arizona willow stands in Utah. Aspen is the preferred forage over willow, but in the absence of aspen utilization of willow could be a significant threat. preferred over willows). Beaver dams can potentially inundate or partially submerge Arizona willow plants which may result in mortality of plants. Because Arizona willow plants are in such abundance distributed along given drainages, it is unlikely that a beaver dam could kill the majority of plants located on a drainage, because the water table has been lowered on the East Fork population, due to habitat degradation, beaver dams could probably increase the water table creating more potential habitat for Arizona willow, providing proper Arizona willow habitat conditions are created by these dams.

This would also be the case in other rodent herbivory. Caution against using small cages as a management tool should be mentioned because it has been known to cause additional mortality on caged plants.

C. Recreation

Little information is known about the threats to the Utah populations of Arizona willow from recreationalists. Probably the greatest threat will come from off-highway vehicle (OHV) users. Riding OHV's into areas to fish is quite popular on the high plateaus of Utah. Where fisheries are good to excellent, which is the case with some of the Utah populations, portions of the stream banks are edged with well beaten paths from OHV use. These paths are devoid of vegetation due to trampling and soil compaction. In addition, these areas of trampling and soil compaction often extend to the water at many places which offer a promising fishing spot. Continued OHV use and soil compaction may seriously threaten the habitats for the Arizona willow in addition to damaging or killing established plants. Also, general use of OHVs during snow-free periods and early-winter snowmobiling have damaged some Arizona willow habitat in the Utah populations. This is occurring in the East Fork of the Sevier River population and other potential areas along the drainage.

Some areas where the willow has been found are popular sites for dispersed camping. At times, tents are located near individual plants of Arizona willow and small latrines and camp refuse are occasionally scattered among the plants. This is not common, but the situation does occur. Recreational wildlife viewing, nature photography and general sight-seeing are not thought to present serious threats to the populations of Arizona willow in Utah.

A closure order will be issued by the Forest Supervisor in 1995 to mitigate dispersed recreation impacts to Arizona willow in the East Fork of the Sevier drainage. Impacts from recreation activities in the other known populations of Arizona willow in Utah are minimal and do not pose a significant threat to the species or its habitat.

D. Construction of Roads and Trails

Threats from roads may be slight for most of the Utah populations of Arizona willow. However, the distinct possibility of a threat from proposed changes in the location of the existing road does occur in the Seven Mile Creek drainage on the Fishlake NF. The Federal Highway Administration has been notified of the existence of Arizona willow within the road corridor of the proposed road realignment.

The Environmental Assessment being prepared by the Federal Highway Administration will address, and provide mitigation measures to protect the Arizona willow in these drainages.

Developed trails do not bisect any of the existing 20 populations in Utah. Trail networks should not be encouraged or planned through known populations of Arizona willow.

E. Timber Harvest

Timber harvesting may effect Arizona willow plants by indirectly increasing siltation in streams and changing overland flows due to the lack of available trees to draw moisture. In addition, skid trails and temporary roads remaining open, in conjunction with, the lack of existing and future woody debris would contribute to stream siltation. Increases in siltation and overland flows may be a results of overstory thinning, skidding, slash piling, and road construction. Increasing stream sediments may affect Arizona willow plant recruitment by decreasing the sites available for germination. High organic loads may contribute to rotting seedlings, thereby decreasing their survival. The same result would occur if numerous trees were logged or removed from the landscape and overland flows increase. With these increased flows sediment loads would increase.

Mitigation for the above potential impacts will be addressed during the NEPA process, especially through in the biological evaluation process for sensitive species.

F. Insect and Disease

The incidence of disease and insect damage in the 20 Utah populations, has not been determined. Specific data will be gathered, as a part of inventory and monitoring research scheduled for completion over the next few years. This information has been gathered by researchers and specialists for several years from populations of the willow in Arizona. Maschinski (1993) and Fairweather (1993) summarize what is known about diseases for Arizona populations of *Salix arizonica*. Some of the key points from their papers are outlined below which support the hypothesis that Utah populations may not have similar disease infestations.

A rust fungi in the genus *Melampsora* infects some Arizona willow plants. Identification of the species in this genus is difficult and has not been determined. This rust has a complex life cycle that may include up to five spore stages some of which must be completed on an alternate host. Some rusts have alternate host species in the gooseberry family (genus *Ribes*), but the alternate host for this rust remains unknown. The extent of the infections and the amount of damage caused varies from plant to plant and is probably related to genetic characteristics of individual clones. This rust affects plant growth and vigor in at least two ways: early leaf drop of infected leaves reduces the photosynthetic potential and stem die back results in the loss of flower buds. The best way to manage for reduced levels of rust infestation is to maximize the genetic diversity and sexual recombination in the population which allows the continual development of resistant clones in the populations. In other words, allow ample opportunity for the continual establishment of new seedlings. Individual plants infected with rust have been observed in Utah, but initial observations suggest that the 20 Utah populations have substantially

lower rates of rust infestation than the populations in Arizona. It is unknown if Arizona willow is infected by any other diseases.

Even less information is known about the threats to the Arizona willow from insects. The brief details below come from Maschinski (1993), which pertain to populations in Arizona, with the assumption that similar insect/willow relationships probably occur in the Utah populations. Reductions in seasonal and long-term plant growth occur when insects substantially defoliate their host plants. Field observations confirm the complete defoliation of some individual Arizona willow plants by mourning cloak butterfly larvae (*Nymphalis antiopa*). There are no other reports of insect damage to the willow in Arizona. For the Utah populations of the Arizona willow, there have not been any field reports of defoliation. Insect galls occur on several Utah populations of Arizona willow.

G. Urbanization and Development of Private Property

Within the boundaries of the Dixie NF, many of these small blocks are in the form of small ranches or subdivided units for cabins.

Arizona willow occurs on 2 sites which are located on or directly adjacent to private property. Both sites have numerous acres of Arizona willow with many thousands of plants. Urbanization, or development of these sites may destroy individual plants and impact populations. As these areas are developed, new roads and trails would be built. Within these areas, recreational use would also increase, which could also impact individual plants and/or populations.

Within the Seven Mile population on the Fishlake NF, one private block of land exists within occupied habitat. Arizona willow is scattered throughout this private block, however development of this site is unlikely due to the marshy condition.

H. Natural Competition

Information is scarce about the threats to Arizona willow from natural competition in the 20 Utah populations. Since this species grows in riparian habitats, it is doubtful that either water or nutrients are limiting resources in most habitats. The most likely resources that may limit the survival and success of this willow are probably the lack of bare mineral soil and light. This willow grows in the spruce-fir zone but not in direct association with these conifers. Spruce (*Picea* spp.) and subalpine fir (*Abies lasiocarpa*) limit the light available to understory species. Conifers do have high water demands and do tend to make sites drier. also, conifer sites typically have a lower pH. More information is needed, but these are possible reasons why Arizona willow does not thrive under conifers.

The lack of bare ground limits the success of Arizona willow because of insufficient suitable mineral-soil microsites for seedling establishment. At least three grass or grasslike species, which are common in the Utah populations, form dense mats and have vigorous

root development from spreading rhizomes. This ability to form dense mats allows these species to effectively cover the exposed bare, mineral-soil substrate where new seedlings of Arizona willow might establish. The three species are water sedge (*Carex aquatilis*), Baltic rush (*Juncus balticus*), and Kentucky bluegrass (*Poa pratensis*).

Maschinski (1993) presents details about the negative impacts of Kentucky bluegrass, an exotic, aggressive sod-forming species in riparian areas. Kentucky bluegrass tolerates grazing and often replaces native bunch grasses. Changes in species composition in some of the Arizona willow habitats may adversely affect the willow. Collection of additional data about natural competition will be a focus of the monitoring effects for the Utah populations.

Emphasis over the next decade will be on use of native plant species for revegetation and restoration projects. Emphasis will also be placed on a reduction of exotic species and noxious plant species.

V. POPULATION NARRATIVES

Following are detailed descriptions of each Arizona willow population in Utah. The location, current conditions, and management actions are included, as well as planned conservation actions for each site.

Population Name: Brian Head Peak

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T.36 S., R. 9 W., S.14. This population is located 15.5 miles south of Parowan, Utah on Highway 143, 0.4 miles west of the Brian Head Peak view site road. (FR 047)

Habitat Size: 1 acre

Narrative description of population and existing conditions: The plants in this population are healthy and range in size from 6 to 36 inches with little to no signs of herbivory. These plants are growing on the south side of Brian Head Peak surrounding a small seep. Domestic sheep graze this area, but no use was observed.

Grazing Allotment(s): Brian Head (sheep)

Livestock Management Unit: Brian Head Peak

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: Little to no herbivory was observed during field monitoring. Recreational trail development in the Brian Head Peak area is expanding and could potentially be a concern.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: None Currently Planned.

Population Name: Brian Head Town

Land Ownership: Private Town of Brian Head

Location: T. 36 S., R. 9 W., S. 2, 10, & 11. This population is located 13.5 miles south of Parowan, Utah on Highway 143 near the town of Brian Head, in Bear Flat across from Chair 2.

Habitat Size: 20 acres

Narrative description of population and existing conditions: The plants in this population are all healthy and vary in size from 6 to 36 inches in height. There were no signs of herbivory within this site. Impacts from human activities as a result of ski area development were not observed.

Grazing Allotment(s): Navajo Ridge Cattle

Livestock Management Unit: Navajo Ridge

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: The primary concern in this area is the development at Brian Head Ski Resort.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: Sample for DNA analysis.

Population Name: Bunker Creek

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: This population is located 1 mile south of the Panguitch Lake Campground off Highway 143, approximately 5 miles west on the Bunker Creek road.

Habitat Size: 1 acre

Narrative description of population and existing conditions: This cluster of plants is located along Bunker Creek. Cattle herbivory is evident along this riparian corridor with minimal signs of use on individual plants.

Grazing Allotment(s): Warren/Bunker (sheep)

Livestock Management Unit: Warren/Bunker

Elk Herd Unit: Panquitch Lake

Site Specific Concerns: The primary concern in this area is recreational development, future timber harvesting and cell associated practices.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: Sample for DNA analysis.

Population Name: CCC Camp

Land Ownership: Cedar Breaks National Monument and
Cedar City Ranger District, Dixie National Forest

Location: T. 36 S., R. 9 W., S. 36., and T. 37 S., R. 9 W., S 1, 12. This population is located 3.5 miles north of the Cedar Breaks National Monument lodge on Highway 143. This site is located where the old CCC camp was situated.

Habitat Size: 42 acres

Narrative description of population and existing conditions: The plants in this population are scattered along the boundary of Cedar Breaks National Monument and the Dixie National Forest. Plants have been stunted due to sheep trampling, bedding and grazing. This corner of the National Forest is a popular bedding and holding area for sheep. Past use from activities related to the old CCC camp also affected this population by stunting growth and individual plant mortality.

Grazing Allotment(s): Six Lakes

Livestock Management Unit: Long Valley

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: The greatest concern in this area is the continued use by sheep as a bedding and holding area.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: Sample for DNA analysis.

Population Name: Castle Creek

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T36S, R8W, S16,17. This population is located 1.5 miles up the Sidney Valley Road (Forest Road 048) on the northeast side down Castle Creek approximately 300 yards.

Habitat Size: 6 acres

Narrative description of population and existing conditions: This population is located near Castle Creek at the south end of Sidney Valley. Plants range in size from 6 to 20 inches in height and are scattered throughout the riparian area which extends downstream approximately 0.5 miles. Plants have been grazed by cattle and possibly elk.

Grazing Allotment(s): Sidney Valley (cattle)

Livestock Management Unit: Sidney Valley

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: Cattle grazing is a concern and elk if populations increase.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: Sample for DNA analysis.

Population Name: Cedar Breaks

Land Ownership: Cedar Breaks National Monument

Location: T36S, R9W, S25. This population is located within Cedar Breaks National Monument, 0.75 miles south of the Panguitch Lake Junction with Highway 143 on the east side of the road. It can be observed from Highway 143 along the forested edge.

Habitat Size: 1 acre

Narrative description of population and existing conditions: This cluster of plants is protected from all livestock grazing. Wildlife herbivory is minimal, if any. Plants range in size from 6 to 36 inches in height. This population is situated directly above the larger Powerline population approximately 200 yards.

Grazing Allotment(s): None--NPS

Livestock Management Unit: None--NPS

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: No concerns have been identified.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: None programmed.

Population Name: Crystal Springs

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T. 37 S., R 9 W., S. 8. This population is located 15 miles east of Cedar City, Utah off Highway 14, approximately 1 mile north off Forest Road 301. These plants are enclosed within a pole fence which surrounds Crystal Springs.

Habitat Size: 1 acre

Narrative description of population and existing conditions: This population is a healthy, isolated population near the Ashdown Gorge Wilderness Area. Plants are located within the fenced spring area. Although the fence needs to be repaired, grazing has had little impact to individual plants.

Grazing Allotment(s): Cedar Canyon (sheep)

Livestock Management Unit: Cedar Canyon

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: Concerns in this area are from sheep grazing and trampling to get to the water source.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: Sample for DNA analysis.

Population Name: East Fork of Sevier

Land Ownership: Powell Ranger District, Dixie National Forest

Location: T39S, R4.5W, S10. This population is located 17 miles south of Tropic Reservoir off Forest Road 087, adjacent to the Robinson Canyon (Forest Road 087) East Fork (Forest Road 209) junction, along the East Fork of Sevier River.

Habitat Size: 2 acres

Narrative description of population and existing conditions: This population lies within a highly degraded section of the East Fork of the Sevier. There are 14 plants in this population ranging in size from 24 to 36 inches in height. These plants all show signs of moderate cattle grazing. Because these plants are located above and below a small beaver dam. Beaver damage could occur.

Grazing Allotment(s): Robinson Canyon Cattle

Livestock Management Unit: Robinson Canyon

Elk Herd Unit: Paunsaugunt

Site Specific Concerns: Concerns in this area are from cattle grazing, possibly beaver herbivory and recreational uses especially ORVs.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: This population should be included in a larger DNA study across Utah and Arizona. See tables, Parts I and III for further details on monitoring and research activities. Initiate research to explore seedling establishment and viability and vegetative propagation..

Population Name: East Power Line

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T36S, R8.5W, S3. This population is located approximately 0.5 miles from the junction of Highway 143 and the Panguitch Lake Highway on the southwest side of the road approximately 500 yards off Highway 143.

Habitat Size: 37 acres

Narrative description of population and existing conditions: This healthy population is located east of the Power Line population which is the third largest known population. Plants are large in stature and range in size from 3 to 36 inches in height. Sheep graze this area during summer months but little or no evidence of use occurs.

Grazing Allotment(s): Dandelion Knoll Sheep

Livestock Management Unit: Dandelion Knoll

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: Road development to access private land

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: None Programmed

Population Name: Hancock Peak

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T36S, R8W, S29. This population is located 4 miles northeast of the junction of Highway 143 and the Panguitch Lake highway approximately 0.4 miles off the highway to the east toward Hancock Peak.

Habitat Size: 24 acres

Narrative description of population and existing conditions: This healthy population occurs along the banks of the upper reaches of Mammoth Creek. These plants range in size between 24 to 60 inches in height. These are some of the largest plants in Utah. Some of the Arizona willow branches that overhang the stream have been damaged due to high spring/summer runoff flows or frost.

Grazing Allotment(s): Dandelion Knoll Sheep

Livestock Management Unit: Dandelion Knoll Sheep

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: None

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: None Programmed

Population Name: Long Valley

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T37S, R8.5W, S14,24. This population is located 2 miles east of the junction of Highway 143 (to Cedar Breaks) off Highway 14. Go east on Highway 14 and turn left (north) on Forest Road 039 to Long Valley. These plants area located along Long Valley Creek in 6 clusters.

Habitat Size: 4 acres

Narrative description of population and existing conditions: This population consists of 6 clusters of plants. They are all found along Long Valley Creek near the stream. Plant heights vary in size from 6 to 24 inches. All 6 clusters are healthy but scattered.

Grazing Allotment(s): Six Lakes Sheep

Livestock Management Unit: Long Valley

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: Concerns in this area are minimal; however, recreational use, if increased could be a problem.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: None Programmed.

Population Name: Lowder Creek

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T36S, R8W, S19,20. This population is located 2 miles north of the Panguitch Lake Highway off Forest Road 041. The population starts at Lowder Pond and extends down Lowder Creek to the east.

Habitat Size: 142 acres

Narrative description of population and existing conditions: This healthy population is the second largest population known. Plants range in size from 6 to 80 inches in height. These plants area healthy and very dense in the drainage bottom. Some moderate grazing was observed by cattle.

Grazing Allotment(s): Sidney Valley Cattle

Livestock Management Unit: Lowder Pond

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: Concerns in this area are from cattle grazing and recreation.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: This population should be included in a larger DNA study across Utah and Arizona. See tables, Parts I and III for further details on monitoring and research activities.

Population Name: Midway Face

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T37S, R8.5W, S26. This population is located 1.2 miles east of the junction of Highways 14 and 143 on the south side of the Highway 14. This cluster of plants is along the forested edge of the meadow in a wet seep area.

Habitat Size: 3 acres

Narrative description of population and existing conditions: This population is a small cluster of plants located in a wet area along the forested edge of the meadow. Plant heights range from 6 to 20 inches. Little to no grazing use was observed in this area.

Grazing Allotment(s): Sage Valley / Horse Valley Sheep

Livestock Management Unit: Sage Valley

Elk Herd Unit: Cedar Mountain

Site Specific Concerns: Concerns in this area are related to future timber harvesting or thinning.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: This population should be included in a larger DNA study across Utah and Arizona.

Population Name: Navajo Lake

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T38S, R9W, S12. This population is located along the northwest end of Navajo Lake in the marshy area..

Habitat Size: 9 acres

Narrative description of population and existing conditions: This population is a healthy, dense cluster of plants located at the northwest end of the lake. The health and vigor of this population could be determined by the water table associated with Navajo Lake. Plant heights range in size from 6 to 36 inches.

Grazing Allotment(s): None

Livestock Management Unit: None

Elk Herd Unit: Cedar Mountain

Site Specific Concerns: Concerns in this area included water table fluctuations and recreation use.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: This population should be included in a larger DNA study across Utah and Arizona.

Population Name: Power Line

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T36S, R9W, S24,25. This population is located approximately 0.5 miles from the junction of Highway 143 and the Panguitch Lake Highway on the southwest side of the road approximately 300 yards off the Panguitch Lake Highway.

Habitat Size: 105 acres

Narrative description of population and existing conditions: This is a very large healthy population that is scattered on National Forest and private land. Plants in this population range in height from 6 to 48 inches. This population is almost a pure stand of Arizona willow. During the development of the power line corridor, a swath was cut directly through the northern portion of this stand. Arizona willow plants have resprouted within this disturbed area.

Grazing Allotment(s): Six Lakes Sheep

Livestock Management Unit: Six Lakes

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: Road development to access private land.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: This population should be included in a larger DNA study across Utah and Arizona.

Population Name: Rainbow Meadows

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T36S, R8W, S13,19,20,24,30. This population is located in the headwaters of Mammoth Creek approximately 2 miles southeast of the town of Brian Head, 0.5 miles east of Brian Head Peak Road (Forest Road 047) down Rainbow Valley.

Habitat Size: 304 acres

Narrative description of population and existing conditions: This population is the largest known population in existence. Plants are healthy throughout the drainage and grow on a variety of site conditions. Plants can be found within a somewhat closed forested canopy and on open, dry, south-facing slopes. Plants range in height from 3 to 48 inches.

Grazing Allotment(s): Brian Head / Dandelion Knoll

Livestock Management Unit: Primarily in Dandelion Knoll (south of Mammoth Creek drainage)

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: Concerns in this area include timber harvest, road and trail construction, recreational use and private land development.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: This population should be included in a larger DNA study across Utah and Arizona.

Population Name: Reed's Valley

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T37S, R8W, S2. This population is located 5 miles south of the Panguitch Lake Highway, 3.3 miles on Forest Road 051 then east on Forest Road 196 near Red Valley ponds.

Habitat Size: 1 acre

Narrative description of population and existing conditions: This small cluster of plants is located near the Red Valley ponds. Plants show signs of moderate cattle use. Plant heights range in size from 6 to 20 inches.

Grazing Allotment(s): Asay Bench Cattle

Livestock Management Unit: Asay Bench

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: Concerns in this area are from cattle grazing.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: None Programmed.

Population Name: Seven Mile Creek

Land Ownership: Loa Ranger District, Fishlake National Forest

Location: This population is about six miles NNE of Fishlake along both sides of Seven Mile Creek and in the adjacent meadows. Access this area by driving north one mile from the junction of State Road 25 and Forest Route 640 at Johnson Valley Reservoir.

UTM coordinates are 441400 E, 4276100 N; 443300 E, 4276100 N; 443300 E, 4280500 N; and 441400 E, 4280500 N.

Habitat Size: 151 acres

Narrative description of population and existing conditions: This population represents the northern most extension of the species' known distribution and extends the range by more than 100 miles. Plants occur along the stream and throughout much of the wide meadow. A few of the individuals are 20 to 30 (40) inches tall, but heights for most of the plants range from 4 to 12 inches. Historically, grazing pressure in this area has been heavy.

Grazing Allotment: Seven Mile Creek Allotment

Livestock Management Unit: Seven Mile

Elk Herd Unit: Fishlake Unit

Site Specific Concerns: The primary concern in this area is livestock herbivory.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See Table.

Research: This population should be included in a larger DNA study across Utah and Arizona. See tables, Parts I and III for further details on monitoring and research activities. Initiate research to explore seedling establishment and viability and vegetative propagation.

Population Name: Sheep Herder Camp

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T36S, R8W, S31. This population is located 1.5 miles south of the junction of Highway 143 and Panguitch Lake Highway on the east side of Highway 143. A small unimproved dirt road leading to an old cabin site goes directly to this site. This small dirt road is approximately 1.2 miles to the cabin.

Habitat Size: 72 acres

Narrative description of population and existing conditions: This is a large, healthy population that is almost a pure stand of Arizona willow. Plants in this population range in height from 6 to 48 inches. Plants in the north end of the population are very large and dense, as opposed to the south end, where plants are small and appear to have been damaged by frost. Scattered signs of sheep grazing are evident, primarily due to the area being used as a bedding area for sheep. The cabin site is a popular camping area for the sheep herder and some grazing impacts from sheep and horses are evident.

Grazing Allotment(s): Six Lakes Sheep

Livestock Management Unit: Six Lakes

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: Concerns in this area are from the area being used as a sheep bedding ground and horse pasture for the sheep herder.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: This population should be included in a larger DNA study across Utah and Arizona. See tables, Parts I and III for further details on monitoring and research activities.

Population Name: Sidney Valley

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T36S, R8W, S7,8,16,17. This population is located 2 miles up the Sidney Valley road (Forest Road 048) on the south side of the road in the large open meadow. This population is in the large open meadow and located along the banks of Castle Creek.

Habitat Size: 79 acres

Narrative description of population and existing conditions: This population is split between a cattle and sheep allotment. Plant stature within these two sites varies. On the cattle allotment side, heights range from 3 to 18 inches and from 3 to 24 inches on the sheep side. Moderate to heavy grazing occurs on the cattle allotment portion, and little to no grazing is evident on the sheep allotment side. Some elk use was observed within the two small upper meadow areas. This area is extremely wet and conditions likely affect plant stature and vigor.

Grazing Allotment(s): Sidney Valley Cattle / Warren Bunker Sheep

Livestock Management Unit: Sidney Valley Cattle / Warren Bunker Sheep

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: Concerns in the area are from cattle grazing, recreational use, water table conditions and elk if populations increase.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: This population should be included in a larger DNA study across Utah and Arizona.

PART IV

**ARIZONA WILLOW
CONSERVATION STRATEGIES BY
MANAGEMENT AGENCY**

D. Arizona Game and Fish Department

THE STATE



OF ARIZONA

GAME & FISH DEPARTMENT

2221 West Greenway Road, Phoenix, Arizona 85023-4399 (602) 942-3000

Governor
Fife Symington

Commissioners:
Chairman Elizabeth T. Woodin, Tucson
Arthur Porter, Phoenix
Nonie Johnson, Snowflake
Michael M. Golightly, Flagstaff
Herb Guenther, Tacna

Director
Duane L. Shroufe

Deputy Director
Thomas W. Spalding

March 3, 1995

Mr. Sam Spiller, Field Supervisor
U. S. Fish and Wildlife Service
Arizona Ecological Services Field Office
2321 West Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4951

Dear Mr. Spiller:

Please find attached our "Conservation Strategies for the Arizona Willow Conservation Agreement." Our proposed strategies represent a firm commitment. Our Department is a committed partner in the conservation of Arizona's candidate species.

I would like the opportunity to meet with you and to discuss reoccurring issues involving the Federal Advisory Committee Act. In my view, the State should always be included as a signatory to Conservation Agreements. Further, it has always been my understanding that the states retain full management authority for all species not listed or proposed for listing under Section 4 of the Endangered Species Act.

Please contact me at your earliest opportunity. I look forward to resolving these issues with you in the very near future.

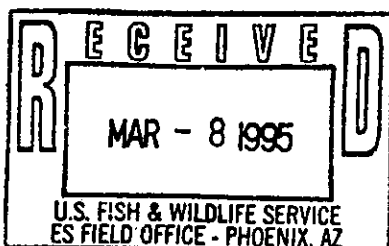
Sincerely,

A handwritten signature in cursive script, appearing to read "Duane L. Shroufe".

Duane L. Shroufe
Director

DLS:jb

cc: Mollie Beaty, Director, U.S. Fish and Wildlife Service
Charles Cartwright, Regional Forester
Lynn Starnes, Acting Regional Director, U.S. Fish and Wildlife Service



**ARIZONA GAME AND FISH DEPARTMENT - CONSERVATION STRATEGIES
FOR THE
ARIZONA WILLOW CONSERVATION AGREEMENT**

INTRODUCTION

The Arizona Game and Fish Department (AGFD) is responsible for population management of terrestrial and aquatic wildlife species in Arizona. In addition to this responsibility, the Department's mission is "to conserve, enhance, and restore Arizona's diverse wildlife resources and habitats through aggressive protection and management programs". Consequently, the Department has a strong commitment toward the restoration and enhancement of sensitive riparian habitats which contain Arizona willow populations through an ecosystem approach.

The stream and riparian habitats which support Arizona willow populations on the Apache-Sitgreaves National Forests (ASNF) also provide important habitat for numerous terrestrial and aquatic wildlife species. These habitats are of key importance for sensitive species such as the Arizona trout (federally - "Threatened"), northern water shrew, and meadow jumping mouse, as well as game species such as elk, deer, and turkey. Management that will improve the health and sustainability of the riparian and adjacent upland ecosystems will enhance conditions for all of these species.

Herbivory of Arizona willow plants by wildlife, particularly elk, has been identified as a threat to the health of the plant depending upon the timing and intensity of use. Individual plants and populations of Arizona willow can be adversely impacted if browsing use of the species is excessive, particularly through the removal of regenerative plant parts (e.g., flowers, seeds, and seedlings), and during critical growth periods (e.g., spring).

Since the potential effects of elk browsing on Arizona willow have been highlighted as a primary wildlife related concern, the conservation strategies identified in this document will focus on elk management. Elk in AGFD - Region I (Pinetop) are managed under the overall population objectives identified in the Region I - "Elk Operational Plan" which tiers to the statewide "Arizona Big Game Strategic Plan. Arizona willow populations on the ASNF are predominantly found within the "Greer/Greens Peak" elk management unit which is identified in the operational plan. It has been determined through recent elk telemetry information that more extensive movement of elk occurs than was first suspected among the elk herd management units (i.e., Greer/Greens Peak, Black River, Milligan Valley) near Arizona willow habitats. Thus, some elk from each of the management units may seasonally utilize riparian habitats where Arizona willow is found. Currently, the elk population management objectives for these three management units are to stabilize elk population density in each unit. Elk

population numbers in these units have been reduced approximately 32 percent (%) through antlerless hunting since 1991. During this same period antlerless elk permits increased for these management units from 120 to 1325 (a 1104% increase).

CONSERVATION STRATEGIES

1. The AGFD is committed to actively participating with the USFS, USFWS, and other interested parties in the development and implementation of monitoring and research activities to determine the effects of wildlife and livestock herbivory on Arizona willow populations and sensitive riparian habitats.
2. The AGFD is committed to aggressively managing elk populations in the elk herd management units (i.e., Greer/Greens Peak, Black River, Milligan Valley) which may affect Arizona willow populations consistent with monitoring and research information. This strategy will include the current stabilization of elk populations in the Greer/Greens Peak, Black River, and Milligan Valley management units. Future population reductions can be implemented when determined necessary based on sound cooperative monitoring and research information.
3. The AGFD is committed to annually updating and revising the Region I - Elk Operational Plan population management objectives for elk management units which contain Arizona willow populations to respond to Arizona willow management concerns.
4. The AGFD is committed to pursuing potential funding sources which may be needed to protect and enhance Arizona willow populations in conjunction with other sensitive stream/riparian species (e.g., Arizona trout) and habitat management activities. For example, this may include funding through Heritage "special use permit" fencing in conjunction with Arizona trout habitat protection, Heritage Stewardship projects (e.g., water shrew habitat enhancement), and other projects.
5. The AGFD is committed in protecting sensitive habitats and species such as the Arizona willow through its September 1993 Cooperative Agreement with the USFS. In this agreement, the Department through its purchase of the White Mountain Hereford Ranch and associated Rudd Creek Allotment waived the Rudd Creek Allotment back to the USFS to provide the ASNF flexibility for livestock management in addressing sensitive species and habitat issues. This has enabled the ASNF, for example, to rest the Lee Valley and Voight pastures on the Voight Allotment from livestock grazing for the past two years with minimal economic impact to the livestock permittee. These pastures contain over 90% of the Arizona willow populations found on the ASNF.

PART IV

**ARIZONA WILLOW
CONSERVATION STRATEGIES BY
MANAGEMENT AGENCY**

E. Utah Division of Wildlife Resources



State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE RESOURCES

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December 28, 1994

Mr. Sam Spiller, Field Supervisor
U. S. Fish and Wildlife Service
Arizona Ecological Services Field Office
2321 West Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4951

Dear Mr. Spiller:

Attached is our "Conservation Strategies for the Arizona Willow Conservation Agreement." This is the result of a meeting in St. George, Utah, on December 8, 1994.

I would like to point out section 6. The Utah Natural Heritage Program became part of the Division last July. We have put a statement in this agreement for the sharing of information collected by any of the Forests involved. The Natural Heritage Program is the central repository in Utah for sensitive, candidate and listed species as per the interagency Memorandum of Understanding (MOU) entitled *Utah Conservation Effort for Sensitive, Candidate and Listed Species* and the Division of Wildlife Resources is the central repository in Utah for wildlife information.

We support this Conservation Agreement and feel it should have favorable results for the Arizona willow in Utah.

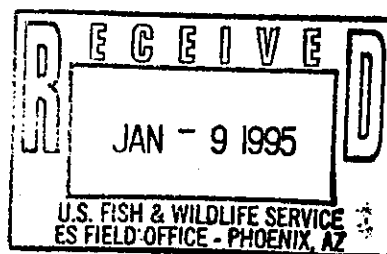
Sincerely,

Robert G. Valentine
Director

Attachments

cc: Bob Williams, USFWS, SLC
Dixie National Forest
Fishlake National Forest

WCQ\WP\ARIZWILL



Utah Division of Wildlife Resources
Conservation Strategies
for the
Arizona Willow Conservation Agreement

Introduction

The Utah Division of Wildlife Resources is responsible for population management of terrestrial and aquatic wildlife species in Utah. In addition, the Division's mission is "to assure the future of protected wildlife for its intrinsic, scientific, educational and recreational values through protection, propagation, management, conservation and distribution throughout the state." Consequently, the Division has a strong commitment toward the restoration and enhancement of wildlife habitats, including riparian habitats which contain Arizona willow populations.

The stream and riparian habitats that support Arizona willow on the Dixie National Forest (DNF) and Fishlake National Forest (FLNF) also provide important habitat for numerous terrestrial and aquatic wildlife species. These habitats are of key importance for endangered, threatened and sensitive species such as Colorado cutthroat trout, Bonneville cutthroat trout, boreal toad, northern leopard frog, long-eared myotis, long-legged myotis and willow flycatcher. Riparian areas are utilized by 75 percent of Utah's neotropical migratory birds (see attachment), and important to game species such as elk, mule deer, moose, pronghorn antelope, Merriam's wild turkey, blue grouse, ruffed grouse, as well as, furbearers such as beaver and muskrat.

Herbivory of Arizona willow plants by wildlife, particularly elk, has been identified in Arizona as a potential threat to the health of the plant. How wildlife affects populations of Arizona willow in Utah is unknown at this time. Intensive radio telemetry studies, however, on elk and moose in the Sevenmile drainage of FLNF have shown little to no use of willow in identified Arizona willow populations. Heavy use by livestock in this drainage is believed to greatly reduce use of the area by big game. Shiras moose in southern Utah have been found to be mainly an upland species using mountain mahogany, serviceberry and oak much more extensively than willow bottoms. Antelope use of willows on the Paunsaugunt is felt to be very low to non-existent, since antelope are rarely found in the upper drainage and tend to use forbs during the summer when they are in Arizona willow habitat.

Elk in Arizona willow habitat in Utah (Southern Region) are managed under the following elk management plans approved in 1994: the Fishlake Elk Plan, the Paunsaugunt Elk Plan and the Panguitch Lake Elk Plan. Moose are recent transplants to the FLNF in 1988-92. Moose numbers have remained low with population estimates at under

100 animals for the entire forest. Management plans for mule deer will be written and approved by 1997. As mentioned above, antelope numbers in Arizona willow habitat are believed to be extremely low.

Conservation Strategies

1. The UDWR is committed to actively participate in the development and implementation of monitoring and research activities to determine the effects of wildlife and livestock herbivory on Arizona willow populations.
2. The UDWR is committed to aggressively managing elk, mule deer, moose and pronghorn antelope within Management Plan guidelines and consistent with monitoring and research information on Arizona willow populations.
3. The UDWR is committed to updating and revising the elk and mule deer management plans' population management objectives in response to willow management concerns, on at least a five-year basis for units which contain Arizona willow populations.
4. The UDWR supports USFS efforts to fence selected areas as needed to protect and research use of Arizona willow populations.
5. The UDWR is committed to assisting in research and monitoring of beaver activities to determine impacts and/or benefits resulting from their use of Arizona willow habitat.
6. The Forest Service will transmit to the Utah Natural Heritage Program (UTNHP) any and all new data collected on the Arizona willow by Forest Service field personnel pursuant to its responsibilities under the interagency Memorandum of Understanding (MOU) entitled *Utah Conservation Effort for Sensitive, Candidate and Listed Species*.

The UTNHP serves as the central repository for this information in Utah pursuant to its responsibilities under the same MOU. The UTNHP assures the Forest Service that sensitive location data will be protected under the provisions of the Government Records Access and Management Act (Utah Code 63-2-101 et seq.).



Signed
Robert G. Valentine, Director
Utah Division of Wildlife Resources

12.28.94

Date

ARIZONA WILLOW CONSERVATION AGREEMENT AND STRATEGY

APPENDIX A

**APACHE - SITGREAVES NATIONAL FORESTS
LAND AND RESOURCE MANAGEMENT PLAN**

**APPLICABLE STANDARDS AND GUIDELINES
FOR THE MANAGEMENT OF ARIZONA WILLOW**

APACHE - SITGREAVES NATIONAL FORESTS LAND AND RESOURCE MANAGEMENT PLAN

APPLICABLE STANDARDS AND GUIDELINES FOR THE MANAGEMENT OF ARIZONA WILLOW

MANAGEMENT DIRECTION

AMENDMENT 1

Outdoor Recreation (p 14)	Where concentrated dispersed recreation conflicts with wildlife or riparian objectives, consider alternative recreation strategies to meet demand.
Wildlife and Fish (p 14-15)	Improve habitat for listed threatened, endangered, or sensitive species of plants and animals and other species as they become threatened or endangered. Work toward recovery and declassification of that species. Identify and protect areas that contain threatened, endangered, and sensitive species of plants and animals.
Riparian (p 15)	Improve vegetation condition in riparian areas. This is an emphasis area for the plan. Improvements will be accomplished by reducing or, in some cases, eliminating adverse impacts from grazing, vehicles, and over-use by man.
Soil, Water, and Air Quality (p 17)	Maintain, or where needed, enhance soil productivity and watershed condition. Put all areas in a satisfactory watershed watershed condition by 2020. Maintain a high quality sustained water yield for Forest users and others. Identify and protect wetlands and floodplains.
Research Natural Areas (RNA's), Botanic Areas, Geologic Areas (p 17)	Manage RNA's for scientific research or baseline studies. Protect potential RNA's pending implementation. Manage specifically designated areas according to the enabling orders and to protect their special qualities.

Table 13. Vegetation Management Practices (continued) (p. 40)

Vegetation Type	Practice	Forest Decade Acres	Rationale
Riparian	Seeding/ Planting	500	This practice is seeding or planting browse and forb species for the benefit of wildlife. Treatment is done to promote browse and forage production in certain areas. This practice is seeding or planting native riparian species to re-establish natural health and composition in riparian ecosystems. The treatments are done in conjunction with control of livestock use levels.

MANAGEMENT AREA DESIGNATIONS

MANAGEMENT AREA #	MANAGEMENT AREA	% OF FOREST	PAGE #
1	Timberlands - Comm/Unsuitable	43.1	119
2	Woodland - Pinyon/Juniper	32.0	145
3	Riparian	0.3	155
4	Grasslands	12.2	165
5	Dev. Recreation Sites	0.1	169
7	Mt. Baldy Wilderness	0.4	177
8	Blue Range Primitive	9.9	181
9	Escudilla Demonstration	0.5	185
10	Research Natural Area	0.1	203
11	Water	0.2	205
12	Bear Wallow Wilderness	0.6	209
13	Escudilla Wilderness	0.3	213
14	Black River	0.1	217
15	West Fork Black River	0.1	221
16	Chevelon Canyon	0.1	225
17	East & West Forks Little Co.R.	0.1	229
18	Sandrock	0.9	233

(P. 44)

APACHE-SITGREAVES FOREST-WIDE STANDARDS AND GUIDELINES

<u>Program Components</u>	<u>Activities</u>	<u>Applicable Management Areas</u>	<u>Standards and Guidelines</u>
All	All	All	Public Involvement/IRM

All projects to implement this Plan will be designed using Region III's 13 Phase Integrated Resource Management Process (IRM).

Projects will be included in the Forest's 10 Yr. Implementation Schedule. This Schedule will be mailed to interested members of the public after each scheduled update.

Wilderness

Administer to maintain the current wilderness character. In most issues between the biological wilderness resources and human preferences, the resource and its preservation will be given priority. (P. 63)

Rehabilitate disturbed areas within wilderness to as natural an appearance as possible, utilizing grass, forb, or tree species natural to the area. Use of heavy equipment to maintain range structural improvements can only occur under Regional Forester's direction. (P. 68)

Range management activities that fall within the parameters of the other wilderness standards and guidelines, are allowed if determined necessary to maintain proper range stocking levels. (P. 68)

Construction of new structural range improvements will be accomplished if determined to be necessary for the purpose of resource protection rather than to accommodate increased number of livestock, and then only if compatible with documented Regional Forester's position on an acceptable wilderness ethic. (P. 68)

Fences should be located and constructed so as not to be visible except at trail crossings. Fencing across trails will be minimized. Range water developments should be located out of view from trails. (P. 68)

Purpose and need and criteria will be approved by Regional Forester. Implementation and allotment plans by Forest Supervisor. (P. 68)

WILDLIFE MANAGEMENT - ALL MANAGEMENT AREAS

Manage threatened, endangered, and sensitive animal, fish, and plant habitat to achieve declassifying in a manner consistent with the goals established by the U.S. Fish and Wildlife Service and Arizona Game and Fish Department. (P. 69)

Implement threatened and endangered species recovery plans. (P. 69)

Monitor actions to determine effect of management practices on threatened and endangered species habitat and the need for a consultation with U.S. Fish and Wildlife Service. (P. 71)

All vegetation manipulations will be coordinated with threatened and endangered species requirements. (P. 71)

The Forest Wildlife Biologist will be consulted on all proposed activities, modifications and other commitments of lands within known habitats of...threatened, endangered or sensitive plants. (P. 71)

Allow area closures to protect habitat of listed, sensitive, or proposed threatened and endangered species. (P. 71)

Consult and cooperate with Arizona Game and Fish Department to achieve management goals and objectives specified in the Arizona Wildlife and Fisheries Comprehensive Plan and State-wide Strategic Plans. Cooperate with the Fish and Wildlife Service and other agencies and organizations as the need arises. (P. 72)

Maintain habitat capability through direct treatments of vegetation, soil, and water. (P. 73)

- d) Avoid placement of roads in meadows whenever feasible and obliterate or relocate roads in key meadows presenting conflicts.

RANGE MANAGEMENT - ALL MANAGEMENT AREAS

Grazing Management in Wilderness is in accordance with FSM 2300 and Conference Report S. 2009 H.R. No. 96-1126. (P. 74)

Continue livestock grazing...while maintaining basic soil and water values. (P. 75)

Cost effective, state-of-the-art management systems and techniques will be used to integrate other resource objectives with livestock management objectives and improve rangeland condition. To improve rangeland conditions and resolve conflicts with other resource objectives, improved allotment management plans will be developed using the Integrated Resource Management process. Improved allotment management plans will give equal consideration of innovative

practices and techniques, structural and nonstructural range improvements, non-use agreements, and stocking rate adjustments to achieve integrated resource objectives. (P. 75)

Timing of early spring grazing will be determined by the District Ranger after a joint inspection with the permittee, and will be based on the appropriate stage of growth and amount of forage available. (P. 75-1)

Salt is not placed within 1/4 mile of any riparian area or water. (P. 76)

Allocate forage to livestock based on direction in management area prescriptions and FSH 2209, range analysis and allotment management planning. (P. 77)

Provide range administration and analysis.

- a) Review and list all grazing allotments using the following criteria by October 1989. (P. 77)

1. Allotments with threatened and endangered species.

Watershed condition will be updated and periodically mapped. (P. 77-1)

Balance grazing capacity and permitted use as soon as possible but no later than 1995. (P. 77-1)

When problems are evident, corrective action will be prioritized annually. Affected parties will be consulted to establish priorities for providing corrective action. The Forest Service will follow up on the effectiveness of the treatment. (p. 78)

WATERSHED - ALL MANAGEMENT AREAS

Inventory

Determine forest watershed conditions using R-3 Hydrology Note No. 20 (water resources inventory). (P. 80-1)

Ensure compliance with Public Law 92-500 "Federal Water Pollution Control Act" and amendments including Clean Water Act of 1977. Implement best management practices to prevent water quality degradation. Implement improvement action where water quality degradation does occur, except for special cases where temporary or short term degradation is occurring from road crossing construction or similar situations. (P. 81)

Provide adequate drainage to prevent concentrated flow and sediment laden runoff from entering water courses. (P. 81)

Designate streamcourses to receive protection during projects (e.g., timber sales, road work). Those streams shown on 7.5 minute quads as a streamcourse should be considered for designated streamcourses. (P. 81)

Roads will be located away from stream bottoms to minimize sediment delivery to the streamcourse whenever possible. (P. 81)

Sediment Production from roads may be minimized by methods such as:

- a. Outsloping of road.
- b. Leadout ditches.
- c. Energy dissipators on culverts.
- d. Grass seeding.
- e. Rock riprap.

Evaluate projects to determine if detailed soil survey (order 2) and hydrologic survey is needed. (P. 81)

Conserve soil and water resources; avoid permanent impairment of site productivity and ensure conservation of soil and water resources. The minimum soil and resource management requirement is to control surface water runoff and erosion at not less than tolerance conditions. 36 CFR 218.23 and 27. (P. 81)

Maintain suitable filter/buffer strips between stream courses and disturbed areas and/or road locations to:

- a. Maintain Suitable Stream Temperature
- b. Maintain Water Quality Standards (P. 83)

Evaluate soils information to predict areas where vegetation type conversion is likely to occur as a result of management activity. (P. 83)

Maintain and enhance riparian vegetation along streams to maintain suitable water temperature and other conditions for streamflow. (P. 83)

Effectively close or obliterate roads causing intolerable resource damage (relocate roads as needed). (P. 83)

MINERALS - ALL MANAGEMENT AREAS

Seek withdrawal of special areas such as research natural areas, special scenic, botanic, recreation and geologic areas, and developed downhill ski areas. Identify areas within 2 years and seek their withdrawal within 4 years of approval of the Forest Plan. (P. 86)

No streambed alteration or removal of material is allowed if it significantly affects on riparian-dependant resources, channel morphology, or streambank stability. (P. 90)

Conduct environmental analysis (tiered to Forest Plan/EIS) of oil and gas lease applications to evaluate consistency with the Forest Plan and to meet standards and guidelines required to protect environmental values and other resources. (P. 86)

Areas in which surface occupancy will be limited or prohibited will include those that are highly visible, that have erosive or unstable soils, critical wildlife habitat, managed community watersheds, etc. (P. 87)

Control surface uses in mineral operations through plans of operations and permits which provide for: preservation of water quality, protection of watershed values, monitoring activities, reclamation or retain contour for other uses (when practical and desirable), reforestation or revegetation with appropriate species to attain soil stability and protect threatened, endangered & sensitive species. (P. 88)

LAND EXCHANGE - ALL MANAGEMENT AREAS

The Land Exchange program operates under several authorities and is the major land adjustment program that can be employed to acquire essentially all of the lands that meet the acquisition criteria.

1. To improve management or benefit specific resources. (P. 100)
2. Lands that contain vital wildlife habitat. (P. 101)
4. Wetlands, riparian areas, and other water oriented lands. (P. 101)
5. Lands that contain unique, natural, or cultural values. (P. 101)
6. Lands that will improve public land management, meet specified administrative needs, or benefit other National Forest programs. (P. 101)
9. Lands that are needed to block up public landownership or meet research needs. (P. 101)

10. Lands that are needed to meet programs prescribed or endorsed by acts or reports of Congress, or the Department of Agriculture. (P. 101)

ROAD MAINTENANCE AND MANAGEMENT

Erosion control measures will be included in road plans. Construct roads to keep sediment out of riparian and aquatic habitats. (P. 104)

If feasible, relocate or remove roads occurring within riparian areas. Do not align roads to pass through the long axis of narrow riparian strips. (P. 107)

FIRE MANAGEMENT - ALL MANAGEMENT AREAS

Consideration will be given to the following in development of the Escaped Fire Situation Analysis.

- 1) Resource management emphasis or threatened areas. (P. 107)

Effects on environment:

- a. Air quality impacts
- b. Visual impacts
- c. Soil/Watershed impacts
- d. Archeological considerations (P. 108)

MANAGEMENT AREA 1 - TIMBER

On aquatic sites - Utilize linear buffer or streams/rivers using a 1200 foot restricted timber harvest (retain dominant trees and snags along the water's edge a distance of 300 feet back from the lake or stream edge. (P. 127)

RIPARIAN (P. 155)

Management Area 3

(Includes Management Areas 1-3, 3-3, 4-3, 5-3, 7-3 which are Ranger District subdivisions of the management area).

Riparian

Analysis Areas 25, 300, 374, 405, 424, 433, 445, 455, 464, 475, 484.

Acres: 10, 101-3, 231 = 6,870

Riparian areas are geographically delineable areas with distinctive resource values and characteristics that are comprised of the aquatic and riparian ecosystems. The aquatic ecosystem includes the stream channel, lake or estuary bed, water, biotic communities and associated habitat features. The riparian ecosystem is the transition between the aquatic and terrestrial ecosystem; identified by soil characteristics or distinctive vegetation communities that require free or unbound water. Riparian areas, with their high productivity and diversity, are a limited and critical ecological resource. In addition to having high timber, range, recreation, and cultural values, riparian areas are vital to the quantity and quality of habitats for fish and some wildlife species, and are basic to the hydrologic function of watersheds. All fish species, many terrestrial wildlife species, and many threatened and endangered species depend on this Forest's riparian areas.

Management emphasis:

Recognizes the importance and distinctive values of riparian areas when implementing management activities. Give preferential consideration to riparian area dependent resources (see glossary) in cases of unsolvable conflicts. Manage to maintain or improve riparian areas to satisfactory riparian condition (see glossary). Other resource uses and activities may occur to the extent that they support or do not adversely affect riparian dependent resources.

Management emphasis will be directed at areas with riparian dependent resources in the following order of priority: 1. Threatened and Endangered Species; 2. cold water fisheries; 3. warm water fisheries; and 4. all other riparian areas. Riparian areas to be emphasized during the life of this plan by priority category are:

Priority 1 - Threatened and Endangered Species (MA-3, Riparian, P. 155-1)

<u>Stream/Riparian</u>	<u>Ranger/District</u>
Lee Valley Creek	Springerville
Stinky Creek	Springerville
Little Colo. E. Fk.	Springerville

Priority 2 - Cold Water Fisheries

<u>Stream/Riparian</u>	<u>Ranger/District</u>
W. Fk. - Black River	Springerville/Alpine
E. Fk. - Black River	Springerville/Alpine
Little Colo. S&W Fks	Springerville/A;pine

Based on the Priority 1 streams listed above, the following allotments are scheduled for immediate management plan revisions. Assessments of these allotments based upon Integrated Resource Management (IRM) will be conducted in 1989. Revised allotment management plans will be completed by 1990. The remaining allotment management plans for allotments containing Priority 1 streams will be revised by 1992. The objective is to achieve satisfactory riparian management in all the allotments in a timely manner. (P. 155-2)

1. Voigt Allotment
2. Hayground Allotment
3. Burro Creek Allotment
4. Reservation Allotment

Forage utilization standards for riparian areas will be determined for each allotment at levels permitting timely achievement of fisheries and T&E objectives. The following general utilization guidelines will guide revisions of allotment management plans. (P. 155-2)

Areas in unsatisfactory riparian condition	0 - 45%
Areas in satisfactory riparian condition	0 - 55%

The above utilization guidelines are a starting point for development of allotment management strategies. Variations in soil productivity, species composition, and sophistication of management will be considered when actual utilization standards are set for each individual allotment during the allotment management plan revision process. (P. 155-2)

Manage for the following indicator species:

<u>Vegetation Management Practices</u>		
<u>Vegetation Type</u>	<u>Practice</u>	<u>First Decade Miles</u>
Riparian	Seeding, Planting	50

(P. 155-2)

Program Components	Activities	Applicable Analysis Areas	Standards and Guidelines
J2	J22	All	<p>Planning and Inventory (P. 156)</p> <p>Inventory and classify all riparian areas by 1996. By 1992, for inventoried priority 1 and 2 riparian areas that are in unsatisfactory condition.</p> <p>a.) Determine the significant causative factors affecting riparian condition. b.) Establish recovery objectives specifically addressing causative factors for each area. c.) Schedule activities to achieve recovery objectives.</p> <p>Priority 1 areas will be placed under proper management by 1992. Priority 2 areas will be placed under proper management by 1996. Proper management means that systems are in place and activities are scheduled that will put unsatisfactory areas on the road to recovery.</p> <p>Recovery activities such as fencing, vegetation projects, and special management prescriptions will be maintained until the affected area(s) are brought into satisfactory condition and as long thereafter as necessary to maintain the area(s) in satisfactory condition, or until they are replaced by more effective techniques.</p>
	J13, J15	All	<p>Acquire riparian areas when funding becomes available or through exchange authorities.</p>
A2	A01	ALL	<p><u>Recreation</u> (P. 157)</p> <p>Recreation use, including off road vehicle use, will be prohibited or restricted and sites rehabilitated in areas in unsatisfactory condition, when recreation was a significant causative factor affecting condition.</p>

Program Components	Activities	Applicable Analysis Areas	Standards and Guidelines
C2	C01	ALL	<p><u>Wildlife Management</u> (P. 158)</p> <p>For Priority 1 and 2 Riparian Areas:</p> <p>a) Aquatic resources:</p> <ol style="list-style-type: none"> (1) Manage for and maintain at least 80 percent of near neutral shade over water surfaces. (2) Manage for and maintain at least 80 percent of streambank total linear distance in stable conditions. (3) Prevent siltation not to exceed 20 percent fines (<855) in riffle areas. (4) Maintain 80 percent of the spawning gravel surface free of inorganic sediment. (5) Manage for stream temperatures not to exceed 68 degrees F. unless not technically feasible. (6) Manage for and maintain at least a 80 Biotic Condition Index on all perennial streams. <p>b) Vegetation resource (where the site is capable of supporting woody plants):</p> <ol style="list-style-type: none"> (1) Manage for and maintain at least 60 percent of the woody plant composition in three or more riparian species. (2) Manage for and maintain at least three age classes of riparian woody plants, with at least 10 percent of the woody plant cover in sprouts, seedlings, and saplings. (3) Manage for and maintain at least 60 percent near natural shrub and tree crown cover.

Program Components	Activities	Applicable Analysis Areas	Standards and Guidelines
C2	C01	ALL	(P. 159) c) Improve wintering waterfowl habitat, including loafing island construction. d) Maintain or improve nesting cover in conjunction with construction of waterfowl islands by seeding herbaceous species unpalatable to large herbivores. e) Determine the need, and then maintain and improve wetland habitat by planting waterfowl forage species along the shorelines. f) Maintain or improve nesting cover and waterfowl forage on existing waterfowl islands and shorelines and in conjunction with construction of waterfowl islands. g) Consult and coordinate wetland improvement projects with affected permittees, individuals, and groups.
	C06,D01		Maintain riparian and meadow communities by providing waters for wildlife and livestock away from sensitive riparian areas. Establish exclosures to determine riparian vegetation potential on representative streams. Wildlife use will be controlled in areas in unsatisfactory condition where wildlife use is a significant causative factor affecting condition.

Program Components	Activities	Applicable Analysis Areas	Standards and Guidelines
			RANGE MANAGEMENT (P. 160)
D2	D01	ALL	<p>Review and as necessary revise allotment management plans using the Integrated Resource Management process to maintain or improve riparian and/or fish stream habitat objectives.</p> <p>Tailor grazing strategies to individual riparian areas. Grazing strategies should be directed toward recovery of both biological systems (vegetation diversity and structure) and physical systems (channel characteristics and hydrology).</p> <p>Grazing systems will consider various seasons of use, levels of utilization and exclusions, and classes of livestock.</p> <p>Determine grazing capability for livestock in each riparian area. The objectives for each riparian area should include livestock use when consistent with other resource objectives and riparian recovery goals.</p>

Program Components	Activities	Applicable Analysis Areas	Standards and Guidelines
			<p>In areas of unsatisfactory riparian condition where livestock grazing has been determined to be a significant causative factor revised allotment management plans will:</p> <ul style="list-style-type: none"> a) Implement intensive management systems which limit grazing and provide rest for riparian areas. b) Reduce stocking to a level that will allow degraded areas to recover. or c) Use site specific exclusion fencing. <p>Affected permittees and other interested individuals and groups will be involved in revision and implementation of revised allotment management plans.</p> <p>Salting in or within one-fourth mile of riparian areas for the purpose of livestock management is prohibited.</p> <p>Limit moving of livestock from pasture to pasture or between allotments along the length of riparian areas except on approved routes as specified in annual permittee instructions. Approval will be granted only where it is determined that there is no alternative route and that riparian areas will not be damaged.</p>

Program Components	Activities	Applicable Analysis Areas	Standards and Guidelines
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Timber (P. 161)

E8	A03, A15 C02, E06		Use vegetation manipulation, e.g. salvage, thinning, slash piling, planting, seeding, only where needed to enhance riparian objectives.
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Soil and Water (P. 161)

F3	F03	300	Enhance watershed condition by obliterating roads causing resource damage, that are unneeded for Forest management. (See plan page 106)
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MANAGEMENT AREA 7

Mount Baldy Wilderness (P. 177)

Two developed trails pass through the wilderness to the top of Mount Baldy. The West Fork Trail begins near the Sheep Crossing parking lot and ascends along the West Fork of the Little Colorado River. The East Fork Trail begins near Phelps Cabin and ascends along the East Fork of the Little Colorado River. The two trails meet near the top and continue to the summit. Each trail is approximately seven miles in length.

Management Emphasis

Emphasize wilderness recreation while maintaining wilderness resource values.

Timber Suitability Land Classification

Total National Forest Land	7,079
Not Capable, Available, or Suitable	7,079
Non-Appropriate	0
Suitable	0

No vegetative management practices are planned in this management area.

Program Components	Activities	Applicable Analysis Areas	Standards and Guidelines
	B01, B03		<p>Develop projects in period 1 to restore wilderness qualities lost due to past management. Implement in period 2 if funding permits. Utilize volunteers, if available. (MBWA, MA7, P. 178)</p> <p><u>Range Management</u> (P. 179)</p> <p>The manner and extent to which livestock grazing is conducted to meet wilderness objectives, range resource needs, desired conditions of ecosystems, and other resources is addressed by individual Allotment Management Plans within the guidelines and policy cited above and approved by the Forest Supervisor. (P. 179)</p> <p>Permits for grazing in wilderness shall be issued only in areas where grazing was established at the time of wilderness designation. (P. 179)</p> <p>Any adjustments in the numbers of livestock permitted to graze in wildernesses should be made as a result of revisions in the normal grazing and land management planning and policy setting process, giving consideration to legal mandates, range condition, and the protection of the range resource from deterioration. (P. 179)</p>

Program Components	Activities	Applicable Analysis Areas	Standards and Guidelines
D3	D02	ALL	It is anticipated that the numbers of livestock permitted to graze in wilderness would remain at the approximate levels existing at the time an area enters the wilderness system. If land management plans reveal conclusively that increased livestock numbers or animal unit months (AUM's) could be made available with no adverse impact on wilderness values such as plant communities, primitive recreation, and wildlife populations or habitat, some increases in AUM's may be permissible (Conference Report S.2009 H.R. No. 96.1126). By the same token, if it is discovered that present livestock numbers have an adverse impact on wilderness values, some decreases in AUM's may be necessary. (P. 180)
	D05,D06		<p><u>Range Structural Improvements</u> (P. 180)</p> <p>New structural improvements and maintaining existing improvements must be considered in the overall context of the purpose and direction of the Wilderness Act and evaluated through practical, reasonable, and uniform application of the "Grazing in National Forest Wilderness Areas" committee guidelines. (P. 180)</p> <p>New structural range improvements deemed necessary for proper management and/or protection of the wilderness resource still must be approved by the Forest Supervisor. (P. 180)</p>
ALL	ALL	ALL	Inventoried riparian areas in this management area will be subject to direction for Management Area. (P. 180)

MANAGEMENT AREA 10

Analysis Areas: 92, 94, 230, 240, 270

Research Natural Areas

Acres: 2,550

This area includes the following research natural areas:

<u>Status</u>	<u>Name</u>	<u>Type</u>	<u>Areas-Acres</u>
Existing	Phelps Cabin	Montane Grassland	312
Recommended	Thomas Creek	Mixed Conifer	500
Recommended	Escudilla Mtn.	Spruce Montane grassland	909
Recommended	Wildcat	Pinyon Juniper	513
Recommended	Hayground	Blue Spruce/ Allium Goodingii	316

This management area is not assigned any grazing capacity.

Management emphasis:

Emphasis protection of the natural ecosystem for research purposes.

Timber Suitability Land Classification

Total National Forest Land	2,550
Not Capable, Available, or Suitable	2,550
Not Appropriate	0
Suitable	0

No vegetative management practices are planned in this management area. (P. 203)

Program Components	Activities	Applicable Analysis Areas	Standards and Guidelines
D2	D01	ALL	<u>Range</u> Range resource planning and inventory. RNA's are assigned no grazing capacity. RNA's are fenced to protect them as necessary. (MA 10, RNA, P. 204)
C2	C01, A01, D01, E04, F01, K03, L01, P01		Coordinate with other resource functions to pursue instream flow rights to protect aquatic ecosystems, fish, and wildlife. (MA-11, WATER, P. 207)

MANAGEMENT AREA 15

Acres: 3,465

East and West Fork of the Black River

The West Fork of the Black River not only provides highly scenic water based recreation opportunities, it also represents a valuable fishery as well as habitat for a wide range of wildlife.

No vegetative management practices are planned in this management area.
(MA-15, E&WFBR, P. 221)

Program Components	Activities	Applicable Analysis Areas	Standards and Guidelines
C3	A12, C01, C03, C04, F02		Improvement such as wildlife spring developments, fish barriers, erosion control structures, trails, etc. can be authorized as long as they do not conflict with the management emphasis. (MA-15, E&WFBR, P. 222)
	D01,D02, F02,D07, D03,C01, C02		The riparian portions of the river corridor are subject to direction of Management Area 3. (P. 222)
	D01,D02, F02,D07, D03,C01, C02		Manage for good riparian condition. (P. 223)
E8	E03		Timber harvesting and road building will not occur in the 7 mile wild segment of the West Fork of the Black River. (P. 223)

MANAGEMENT AREA 17

Acres: 2,360

East and West Forks Little Colorado River

In addition, within the corridor are several unique stands of willow deserving special protection.

Management Emphasis:

Emphasize semi-primitive recreation opportunities while protecting the unique botanical qualities.

Timber Suitability Land Classification

Total National Forest Land	2,360
Not Capable, Available, or Suitable	2,360
Non-Appropriate	0
Suitable	0

No vegetative management practices are planned in this management area.
(MA-17, P. 229)

Program Components	Activities	Applicable Analysis Areas	Standards and Guidelines
	A08		Avoid any encouragement of recreation activities within unique willow stands. (P. 230)
	C03		Improve habitat capability for fish and maintain stream channel stability. (P. 230)
D2	D01,D02, D03,D07, C01,C02, F02		The riparian portions of the river corridor are subject to direction for Management Area 3. (P. 230) -Manage for satisfactory riparian condition. -Insure there is no effect on the unique willow stands caused by grazing.

GLOSSARY (P. 277-1)

Riparian Area Dependent Resources - These are wildlife and fish habitat and watershed condition; and visual and water quality.

Satisfactory riparian condition - This means being in a condition where stream banks are stabilized, head cutting is not evident, riparian vegetation is present and increasing in density and vitality. Areas that do not approximate satisfactory riparian condition will be classified as being in unsatisfactory riparian condition. Recovering areas will be classified as unsatisfactory riparian condition until riparian recovery objectives are met.

TABLE 7. Recreation Site Development (P. 26-2)

Capital Investment

The following are additional identified projects that may be implemented if funds become available (not in priority).

Gabaldon Campground redesign, relocation, and expansion.

Program Components	Activities	Applicable Analysis Areas	Standards and Guidelines
	A08		Avoid any encouragement of recreation activities within unique willow stands. (P. 230)
	C03		Improve habitat capability for fish and maintain stream channel stability. (P. 230)
D2	D01,D02, D03,D07, C01,C02, F02		The riparian portions of the river corridor are subject to direction for Management Area 3. (P. 230) -Manage for satisfactory riparian condition. -Insure there is no effect on the unique willow stands caused by grazing.

GLOSSARY (P. 277-1)

Riparian Area Dependent Resources - These are wildlife and fish habitat and watershed condition; and visual and water quality.

Satisfactory riparian condition - This means being in a condition where stream banks are stabilized, head cutting is not evident, riparian vegetation is present and increasing in density and vitality. Areas that do not approximate satisfactory riparian condition will be classified as being in unsatisfactory riparian condition. Recovering areas will be classified as unsatisfactory riparian condition until riparian recovery objectives are met.

TABLE 7. Recreation Site Development (P. 26-2)

Capital Investment

The following are additional identified projects that may be implemented if funds become available (not in priority).

Gabaldon Campground redesign, relocation, and expansion.

**ARIZONA WILLOW
CONSERVATION AGREEMENT AND STRATEGY**

APPENDIX B

**DIXIE NATIONAL FOREST
LAND AND RESOURCE MANAGEMENT PLAN**

**APPLICABLE STANDARDS AND GUIDELINES
FOR THE MANAGEMENT OF ARIZONA WILLOW**

DIXIE NATIONAL FOREST LAND AND RESOURCE MANAGEMENT PLAN

APPLICABLE STANDARDS AND GUIDELINES FOR THE MANAGEMENT OF ARIZONA WILLOW

Management Areas where Arizona willow populations currently exist:

Management Area 1A - DEVELOPED RECREATION

*Dixie LRMP IV - 29: 2; IV - 30: 4; IV - 31: 7 & 8.

- 2 Close or rehabilitate dispersed sites where unacceptable environmental damage is occurring.
- 4 Discourage camping within a minimum of 100 feet from lakes and streams unless exceptions are justified by terrain or specific design which protects the riparian and aquatic ecosystems.
- 7 Protect spring sources of drinking water near trails from contamination by recreation stock and livestock where culinary sources are scarce or heavily used by recreationists.
- 8 Prohibit recreational stock along lake shores and streambanks except for watering and through-travel.

Management Area 1B - WINTER SPORTS SITES

*Dixie LRMP IV - 29: 2; IV - 30: 4; IV - 31: 7 & 8.

- 2 Close or rehabilitate dispersed sites where unacceptable environmental damage is occurring.
- 4 Discourage camping within a minimum of 100 feet from lakes and streams unless exceptions are justified by terrain or specific design which protects the riparian and aquatic ecosystems.
- 7 Protect spring sources of drinking water near trails from contamination by recreation stock and livestock where culinary sources are scarce or heavily used by recreationists.

- 8 Prohibit recreational stock along lake shores and streambanks except for watering an through-travel.

Management Area 2A - SEMI-PRIMITIVE RECREATION

*Dixie LRMP IV - 29: 2; IV - 30: 4; IV - 31: 7 & 8.

- 2 Close or rehabilitate dispersed sites where unacceptable environmental damage is occurring.
- 4 Discourage camping within a minimum of 100 feet from lakes and streams unless exceptions are justified by terrain or specific design which protects the riparian and aquatic ecosystems.
- 7 Protect spring sources of drinking water near trails from contamination by recreation stock and livestock where culinary sources are scarce or heavily used by recreationists.
- 8 Prohibit recreational stock along lake shores and streambanks except for watering an through-travel.

Management Area 2B - ROADED NATURAL RECREATION

*Dixie LRMP IV - 29: 2; IV - 30: 4; IV - 31: 7 & 8.

- 2 Close or rehabilitate dispersed sites where unacceptable environmental damage is occurring.
- 4 Discourage camping within a minimum of 100 feet from lakes and streams unless exceptions are justified by terrain or specific design which protects the riparian and aquatic ecosystems.
- 7 Protect spring sources of drinking water near trails from contamination by recreation stock and livestock where culinary sources are scarce or heavily used by recreationists.
- 8 Prohibit recreational stock along lake shores and streambanks except for watering an through-travel.

Management Area 6A - LIVESTOCK GRAZING

*Dixie LRMP IV - 36: 2, 3, 4, 5.

- 2 Remove livestock from allotments for the remainder of the grazing season when proper use is reached.
- 3 Manage livestock and wild herbivores forage use by implementing allowance use guides.
- 4 Achieve or maintain satisfactory range conditions on all rangelands.
- 5 Salt blocks shall be placed so as to minimize impact upon riparian ecosystem.

Management Area 7A - WOOD PRODUCTION AND UTILIZATION

*Dixie LRMP IV - 55: 1, 2.

- 1 Use prescribed fire to accomplish resource management objectives, such as reducing fuel load buildup, wildlife habitat improvement, etc.
- 2 Limit use of prescribed fire on areas in or adjacent to riparian areas to protect riparian and aquatic values.

"General Direction" standards and guidelines found within the Dixie LRMP that provide further resource protection to Arizona willow populations:

1. WILDLIFE HABITAT/MIS SPECIES

A. WILDLIFE AND FISH RESOURCE MANAGEMENT

*Dixie LRMP IV - 33: 1, 2, 2a, 6a, 6b, 7.

- 1 All federally-listed endangered or threatened plant and animal species that might be affected by management activities.
- 2 In addition to the above, use indicator species that represent the following categories:
 - 2a Riparian and/or wetland dependent species (yellow-breasted chat).

- 6a Maintain 40 percent or more of overhanging grasses, forbs sedges and shrubs along banks of streams.
- 6b Maintain 50 percent or more of total streambank length in stable condition.
- 7 Manage and provide habitat for recovery of endangered and threatened species.

B. WILDLIFE HABITAT IMPROVEMENT AND MAINTENANCE

*Dixie LRMP IV - 34: 1b, 2.

- 1b In management areas dominated by non-forested ecosystems, maintain deer and elk hiding cover as follows:

% of Unit Forested	% of Forested Area in Cover
35-50	At least 50%
20-34	At least 60%
Less than 20	At least 75%

These levels may be exceeded temporarily during periods when stands are being regenerated to meet the cover standard, or to correct tree disease, problems, in aspen stands, or where windthrow or wildfire occurred. In critical big game habitat maintain hiding cover along at least 75 percent of the edge of arterial and collector roads, and at least 60 percent along streams and rivers, where trees occur.

- 2 Improve habitat capability through direct treatments of vegetation, soil, and waters.

C. RANGE RESOURCE MANAGEMENT

*Dixie LRMP IV - 36: 2, 3, 4, 5.

- 2 Remove livestock from allotments for the remainder of the grazing season when proper use is reached.
- 3 Manage livestock and wild herbivores forage use by implementing allowance use guides.
- 4 Achieve or maintain satisfactory range conditions on all rangelands.
- 5 Salt blocks shall be placed so as to minimize impact upon riparian ecosystem.

2. RIPARIAN AREA MANAGEMENT

A. RIPARIAN AREA MANAGEMENT

*Dixie LRMP IV - 41: 1, 2, 3, 4, 4a, 4b.

- 1 Special protection and management will be given to land and vegetation for a minimum of 100 feet from the edges of all perennial streams, lakes and other bodies of water or to the outer margin of the riparian ecosystem if wider than 100 feet.
- 2 Design and implement activities in management areas to protect and manage the riparian ecosystem.
- 3 Prescribe livestock grazing systems to achieve riparian objectives.
- 4 Prescribe silvicultural systems to achieve riparian area objectives.
- 4a Maintain shade, bank stability and sediment standards as specified under Wildlife and Fish Resource Management, Standards and Guidelines.
- 4b Maintain at least 70 percent of the linear distance of all riparian ecosystems in at least an upper mid-seral successional stage.

B. WATER RESOURCE IMPROVEMENT AND MAINTENANCE

*Dixie LRMP IV - 42: 2, 5.

- 2 Improve or maintain water quality to meet State water quality standards. However, where the natural background water pollutants cause degradation, it is not necessary to implement improvement actions. Short-term or temporary failure to meet some parameters of the State standard, such as increased sediment from road crossing construction or water resource development may be permitted in special cases.
- 5 Limit use of herbicides, insecticides, rodenticides, or other chemicals which are harmful to either the aquatic ecosystem, desired terrestrial fauna or human health. Use these chemicals only when and where possible transport to surface water has a low probability of occurrence. Follow all label requirements concerning water quality protection.

C. WATER USE MANAGEMENT

*Dixie LRMP IV - 42: 1.

- 1 Maintain needed instream flows and protect public property and resources.

3. GENERAL DIRECTION

A. MINING LAW COMPLIANCE AND ADMINISTRATION

*Dixie LRMP IV - 44: 1.

- 1 Minimize or, as appropriate, prevent adverse impacts on surface resources.

B. RIGHTS-OF-WAY AND LAND ADJUSTMENTS

*Dixie LRMP IV - 46: 2, 3, 3b, 3c.

- 2 Ensure floodplain and wetland values are approximately equal on both offered and selected tracts in proposed land exchanges or that values are in favor of the United States.
- 3 Classify lands or interest in lands for acquisition where lands are valuable for NFS purposes according to the following priorities:
 - 3b Where lands or rights-of-way are needed to meet resource management goals and objectives.
 - 3c Lands which provide habitat for threatened and endangered species of animals or plants.

C. SOIL RESOURCE MANAGEMENT

*Dixie LRMP IV - 48: 1e, 4.

- 1e Prevent livestock and wildlife grazing which reduces the percent of plant cover to less than the amount needed for watershed protection and plant health.
- 4 Identify at the project level, upland areas that are immediately adjacent to riparian (prescription 9A) management areas. Adjacent upland areas are those portions of a management area which, when subjected to management activities have a potential for directly affecting the condition of the adjacent riparian management area. The magnitude of effects is dependent upon slope

steepness, and the kind, amount, and location of surface and vegetation disturbance within the adjacent upland unit.

D. TRANSPORTATION SYSTEM MANAGEMENT

*Dixie LRMP IV - 49: 1, 2, 2a.

2 Manage road use by seasonal closure if:

2a Use causes unacceptable damage to soil and water resources due to weather or seasonal conditions.

E. DAM ADMINISTRATION AND MAINTENANCE

*Dixie LRMP IV - 52: 7, 8, 9, 10.

7 Encourage riparian habitat by establishing vegetation on potential areas around the periphery of the impoundment.

8 Resolve conflicts between livestock use and recreation/water quality/wildlife in favor of the latter.

9 Clear merchantable and unmerchantable trees and shrubs to a line two feet above the high water line when this vegetation will later substantially interfere with water level regulation, recreation use or public safety.

10 Coordinate design, water rights, diversions, etc., with State laws and regulations.

**ARIZONA WILLOW
CONSERVATION AGREEMENT AND STRATEGY**

APPENDIX C

**FISHLAKE NATIONAL FORESTS
LAND AND RESOURCE MANAGEMENT PLAN**

**APPLICABLE STANDARDS AND GUIDELINES
FOR THE MANAGEMENT OF ARIZONA WILLOW**

**FISHLAKE NATIONAL FOREST
LAND AND RESOURCE MANAGEMENT PLAN**

**APPLICABLE STANDARDS AND GUIDELINES
FOR THE MANAGEMENT OF ARIZONA WILLOW**

Management Areas where Arizona willow populations are currently known from the Fishlake National Forest:

Management Prescription 4A - Emphasis is on fish habitat improvement.

*Fishlake Land and Resource Management Plan (LRMP) IV - 85

Emphasis is on fish habitat improvement where aquatic habitat is below productive potential. Habitat enhancement techniques may be used on lake, reservoir, river or stream habitats and their adjacent riparian ecosystems.

The goals of management are to maintain or improve aquatic habitat condition for fish at or above a good habitat condition rating, maintain stable stream channels, meet water quality standards for cold water fisheries, provide healthy, self-perpetuating riparian plant communities and provide habitats for viable populations of wildlife.

Management techniques that may be used include fencing and planting in riparian ecosystems, drop structures, bank stabilization structures, boulder placement, pool blasting, removal of fish barriers, construction of fish barriers, selective tree removal, lake aeration, aquatic weed control, non-game fish control, dam rehabilitation and maintenance of instream flows and conservation pools.

Livestock grazing is at a level that will assure maintenance of the vigor and regenerative capacity of the riparian plant communities as well as maintaining shade and bank stability for streams. Vehicular travel is limited on roads and trails at times when excessive stream sedimentation would result. New road construction is restricted within riparian areas unless no feasible alternative exists. Developed recreation facility construction for overnight used is prohibited within the 100-year floodplain.

Forest riparian ecosystems are treated to improve wildlife and fish habitat diversity through specified silvicultural objectives.

*Fishlake LRMP IV - 86: 1.

- 1 **VISUAL RESOURCE MANAGEMENT** - Design and implement management activities which sustain inherent visual values of riparian areas and blend with the surrounding natural landscapes.

*Fishlake LRMP IV - 88: 5.

- 5 **RECREATION OPPORTUNITIES AND USE ADMINISTRATION** - Prohibit motorized vehicle use off forest system roads and trails (except snowmobiles operating on snow) where needed to protect soils, vegetation, or special wildlife habitat.

*Fishlake LRMP IV - 88: 1, 4.

- 1 **WILDLIFE HABITAT IMPROVEMENT AND MAINTENANCE** - Provide habitat diversity to meet or exceed Utah DWR population goals for all aquatic vertebrate species.
- 4 Maintain instream flows in cooperation with UDWR to support a sustained yield of natural fisheries resources.

*Fishlake LRMP IV - 88:1; IV - 89: 1 (cont); IV - 90: 2.

- 1 **RANGE RESOURCE MANAGEMENT** - Maintain proper stocking and livestock distribution to protect riparian ecosystems.

- a. Livestock grazing in riparian areas will be controlled at the following levels of utilization:

<u>Grazing System</u>	<u>Vegetation Class Condition</u>	<u>Total Forage Utilization By Weight</u>
-----------------------	---------------------------------------	-----------------------------------------------

1. Grass/Grasslike Forb Vegetative Type:

Continuous	Good	40%
	Fair	30%
	Poor	20%
Rest-Rotation	Heavy Use Pasture ⁽¹⁾	60%
	Light Use Pasture	40%
Deferred-Rotation	Heavy Use Pasture ⁽²⁾	50%
	Light Use Pasture	35%

2. Willow/Grass/Grasslike Vegetative Type:

Continuous	Good	55%
	Fair	40%
	Poor	30%

3. Willow-Forest Vegetative Type:

Rest-Rotation	Heavy Use Pasture ⁽¹⁾	70%
	Light Use Pasture	50%
Deferred-Rotation	Heavy Use Pasture ⁽²⁾	60%
	Light Use Pasture	40%

¹ Trampled areas and streambank damage caused during heavy use year should be healed or stabilized within the following rest year.

² Bare soil caused by disturbance in a heavy use pasture should be stabilized or healed prior to use the following year.

Browse utilization within the riparian ecosystem will not exceed 50% of new leader production.

The limiting factor on a given riparian area will be whichever utilization standard is reached first, either total forage or browse.

- 2 Prohibit trailing of livestock along the length of riparian areas except where existing stock driveways occur. Rehabilitate existing stock driveways where damage is occurring in riparian areas. Relocate them outside riparian areas if possible, and if necessary to achieve riparian area goals.

*Fishlake LRMP IV - 91: 6.

- 6 **SILVICULTURAL PRESCRIPTION** - Prohibit log landing and decking areas within the riparian area.

*Fishlake LRMP IV - 91: 2, 3, 3b, 4, 5, 6, 7, 8.

- 2 **WATER RESOURCE IMPROVEMENT AND MANAGEMENT** - Prevent stream channel instability, loss of channel cross-sectional areas, and loss of water quality resulting from activities that alter vegetative cover.

- 3 Determine the effects on water quality and sediment yields from vegetation manipulation and road construction projects through the use of appropriate modeling and quantification procedures.
- 3b Maintain at least 80 percent of potential ground cover within 100 feet from the edges of all perennial streams, lakes and other waterbodies, or to the outer margin of the riparian ecosystem, where wider than 100 feet.
- 4 Avoid channelization of natural streams. Where channelization is necessary for flood control or other purposes, use stream geometry relationships to re-establish meanders, width/depth ratios, etc. Consistent with each major stream type.
- 5 Treat areas disturbed by management activities to reduce erosion to natural rates.
- 6 Stabilize streambanks, which are damaged by management activities, with methods that emphasize revegetation.
- 7 Design and locate settling ponds to reduce downstream sediment yield and to prevent washout during high water. Locate settling ponds outside of the active channel. Restore any channel changes to hydraulic geometry standards for each stream type.
- 8 Include wildlife and fish habitat, aesthetic, and safety goals when planning projects that result in vegetation type conversion.

*Fishlake LRMP IV - 92: 1; IV - 93: 2, 3.

- 1 **SOIL RESOURCE MANAGEMENT** - Rehabilitate disturbed soils areas where adverse impacts would occur according to the following priorities:
 - Aquatic ecosystems;
 - Riparian ecosystems; and
 - Riparian areas outside of aquatic and riparian ecosystems.
- 2 Prevent soil surface compaction and disturbance in riparian ecosystems. Allow use of heavy construction equipment for construction, residue removal, etc. only during periods when the soil is least susceptible to compaction or rutting.
- 3 Maintain or enhance the long-term productivity of soils within the riparian ecosystem.

*Fishlake LRMP IV - 93: 1, 1b, 2, 3.

- 1 **MINING LAW COMPLIANCE AND ADMINISTRATION** - Minimize detrimental disturbance to the riparian area by mineral activities. Initiate timely nd

effective rehabilitation of disturbed areas and restore riparian areas to a state of productivity comparable to that before disturbance.

- 1b Locate the lower edge of disturbed or deposited soil banks outside the active floodplain.
- 2 Locate mineral removal activities away from the water's edge or outside the riparian area.
- 3 Design and locate placer mine settling ponds to prevent washout during high water. Locate settling ponds outside of the active channel. Restore any channel changes to hydraulic geometry standards for each stream type.

Management Prescription 6B - Emphasis is on livestock grazing.

***Fishlake LRMP IV - 109**

Range resource management level D (intensive management) is applied. This involves use of structural and non-structural improvements with associated maintenance. Any grazing system can be applied which is consistent with maintaining the environment and providing for multiple use of the range. Condition is improved through use of vegetation and soil restoration practices, improved livestock management, and regulation of other resource activities. Investment in structural and non-structural improvements is moderate to high. Structural improvement benefit or at least do not adversely affect wildlife. Non-structural restoration and forage improvement practices available are seeding, planting, burning, fertilizing, pitting, furrowing, spraying, crushing, plowing, and chaining.

Investments are made in compatible resource activities. Dispersed recreational opportunities vary between semi-primitive non-motorized and roaded natural. Management activities are evident but harmonize and blend with the natural setting.

***Fishlake LRMP IV - 112: 4.**

- 4 **RECREATIONAL OPPORTUNITIES AND USE ADMINISTRATION** - Prohibit motorized vehicle use off forest system roads and trails (except snowmobiles operating on snow) where needed to protect soils, vegetation, or special wildlife habitat.

***Fishlake LRMP IV - 112: 1**

- 1 **WILDLIFE AND FISH RESOURCE MANAGEMENT** - Maintain habitat capability for management indicator species.

Listed below are "General Direction" standards and guidelines found within the Fishlake LRMP that provide further resource protection to Arizona willow populations:

FOREST DIRECTION GOALS

*Fishlake LRMP IV - 3: 4.

- 3 - **WILDLIFE AND FISH** - Identify and improve habitat for sensitive, threatened and endangered species including participation in recovery efforts for both plants and animals.

*Fishlake LRMP IV - 4: 2, 3.

- 2 **RANGE** - Maintain range lands being used by livestock in at least fair condition with stable or upward trend through the use of proper management and restoration measures.
- 3 Encourage permittees to assume greater responsibility and latitude in managing permitted grazing use.

*Fishlake LRMP IV - 4: 4.

- 4 **SOIL AND WATER** - Maintain productive streams, lakes, and riparian areas and mitigate hazards on floodplains.

*Fishlake LRMP IV - 19: 5, 6.

- 5 **WILDLIFE AND FISH RESOURCE MANAGEMENT** - Manage and provide habitat for recovery of endangered and threatened species.
- 6 Do not allow activities or practices that would negatively impact endangered, threatened, or sensitive plant or animal species.

*Fishlake LRMP IV - 21: 2; IV - 23: 3.

- 2 **RANGE RESOURCE MANAGEMENT** - Manage livestock and wild herbivores forage use by implementing proper use guides.
- 3 Achieve or maintain fair or better range conditions on all rangelands used by livestock.

*Fishlake LRMP IV - 33: 1, 1b; IV - 34: 2, 3, 4, 4A, 4a, 5.

- 1 **RIPARIAN AREA MANAGEMENT** - Special protection and management will be given to floodplains, wetlands, and all land and vegetation for a minimum of 100 feet from the edges of all perennial streams, lakes and other bodies of water or to the outer margin of the riparian ecosystem if wider than 100 feet.
- 1b Maintain riparian dependent resource values including wildlife, fish, vegetation, watershed, and recreation in a stable or upward trend.
- 2 Design and implement activities in management areas to protect and manage the riparian ecosystem.
- 3 Prescribe livestock grazing systems to achieve riparian area objectives along streams capable of supporting self-sustaining fisheries.
- 4 Prescribe silvicultural systems to achieve riparian area objectives.
- 4A Prohibit the operation of motorized equipment within the riparian area except at constructed stream crossings.
- 4a Maintain shade, bank stability and sediment standards as specified under wildlife and fish resource management standards and guidelines.
- 5 Locate and construct arterial and collector roads to maintain the basic natural condition and character of riparian areas.

*Fishlake LRMP IV - 35: 2, 4.

- 2 **WATER USES MANAGEMENT** - Protect water right applications of others when such uses will lower streamflows below levels acceptable for national forest uses and purposes.
- 4 Determine and obtain rights to other surface and ground waters to meet multiple use requirements.

*Fishlake LRMP IV - 35: 4, 4a; IV - 36: 5.

- 4 **WATER RESOURCE IMPROVEMENT AND MAINTENANCE** - Rehabilitate disturbed areas that are contributing sediment directly to perennial streams as a result of management activities to maintain water quality and re-establish vegetation cover.

- 4a Reduce to natural rate any erosion due to management activity through necessary mitigation measures such as water-barring and revegetation. Rehabilitation measures will be implemented within one year of the activity.
- 5 Limit use of herbicides, insecticides, rodenticides, or other chemical agents as part of terrestrial management activities to times and places where possible transport to or by surface water has a low probability of occurrence. Follow all label requirements concerning water quality protection.

*Fishlake LRMP IV - 36: 1.

- 1 **MINING LAW COMPLIANCE AND ADMINISTRATION** - Minimize or, as appropriate, prevent adverse impacts on surface resources.

*Fishlake LRMP IV - 39: 2, 3C, 3D; IV - 40: 4D.

- 2 **RIGHTS-OF-WAY AND LAND ADJUSTMENT** - Insure floodplain and wetland values are approximately equal on both offered and selected tracts in proposed land exchanges or that values are in favor of the United States.
- 3C Lands which provide habitat for threatened and endangered species of animals and plants.
- 3D Lands which include floodplain or wetlands.
- 4D When critical or unique resource (wetlands, floodplains, essential big game winter range, threatened or endangered species habitat, historical or cultural resources, critical ecosystems, etc.) Effects are mitigated by reserving interests to protect the resource, or by exchange where other critical resources to be acquired are considered to be of equal or greater value.

*Fishlake LRMP IV - 42: 1, 1D, 1E, 1I.

- 1 **SOIL RESOURCE MANAGEMENT** - Maintain soil productivity, minimize man-caused soil erosion, and maintain the integrity of associated ecosystems.
- 1D Revegetate all areas, capable of supporting vegetation, disturbed during road construction and/or reconstruction to stabilize the area and reduce soil erosion. Where practicable use less palatable plant species on cuts, fills, and other areas subject to trampling damage by domestic livestock and big game to discourage grazing.
- 1E Prevent livestock and wildlife grazing which reduces the percent of plant cover to less than the amount needed for watershed protection and plant health.

- 1I Restore soil disturbance caused by human use to soil loss tolerance levels commensurate with the natural ecological processes for the treatment areas.

*Fishlake LRMP IV - 46: 2B.

- 2B **TRAIL SYSTEM MANAGEMENT** - Maintain drainage structures to prevent unacceptable resource damage.

*Fishlake LRMP IV - 49: 2, 3.

- 2 **VEGETATION TREATED BY BURNING** - Limit use of prescribed fires on areas adjacent to riparian areas to protect riparian and aquatic values.
- 3 Use unplanned ignition on areas identified in this plan to achieve management objectives.

*Fishlake LRMP IV - 49: 1.

- 1 **INSECT AND DISEASE MANAGEMENT** - Prevent or suppress epidemic or threatening insect and disease populations with an integrated pest management (IPM) approach consistent with resource management objectives.

**ARIZONA WILLOW
CONSERVATION AGREEMENT AND STRATEGY**

APPENDIX D

**FOREST SERVICE COMMUNICATIONS REGARDING
DISCOVERY OF ARIZONA WILLOW IN UTAH**



THE UNIVERSITY OF ARIZONA
TUCSON, ARIZONA 85721

HERBARIUM
COLLEGE OF AGRICULTURE

November 20, 1975

Mr. Carl-Eric Graufelt
P. O. Box 338
Whiteriver, Arizona 85941

Dear Carl-Eric:

The Salix you left with us appears to be a new one. Your specimen 69-191, identified as Salix pseudocordata Anderss., was annotated in 1974 by Robert Dorn as Salix arizonica Dorn and was designated by him as the holotype. Unfortunately I have not been able to find any published description of this new species but your most recent specimen compares favorably with 69-191 and the other specimens from Baldy collected by others and previously identified as S. pseudocordata but also annotated to S. arizonica by Dorn.

The mint is Stachys rothrockii Gray, as previously determined.

Sincerely,

A handwritten signature in cursive script, appearing to read "Caryl L. Bushman".

Caryl L. Bushman
Research Assistant
Herbarium

14 June 1993

Dr. Ben Franklin
Utah Natural Heritage Program
1636 West North Temple, Ste. 316
Salt Lake City, UT 84116-3193

Dear Dr. Franklin:

I have recently seen a specimen, which appears to be Salix arizonica, from Utah. If this report is correct it would be the first report of this federally listed species from outside of Arizona (were it is known only from the White Mountains).

Unfortunately the herbarium label data are very inadequate. The specimen is in the U.S. Forest Service Herbarium, now housed at the Rocky Mountain Herbarium. The label is a U.S. Forest Service label with the number 11394. There is no collector's name but collection number is given as 80. The locality is given as Sevier Forest, 10,000 feet, and the collection was made on 5 August 1913. Other information on the label is "Clay and black soil loam. Moist meadow, abundant in places, and browsed by sheep and stock." All of these comments could apply to S. arizonica.

It would be very interesting if we could relocate the place in which this collection was made. S. arizonica is closely related to S. boothii and the population may prove to be that species, but the vegetative specimen we have looks exactly like S. arizonica.

There is the possibility that Sevier Forest has been relocated since 1913 so that should be taken into consideration.

Please let me know if you are interested in following up on this.

Sincerely,

George Argus,
Research Scientist

June 8, 1994

Mr. Jon Cooley
Endangered Species Coordinator
White Mountain Research Enterprise
White Mountain Apache Tribe
P.O. Box 220
White River, Arizona 85941

Dear Mr. Cooley:

Dr. George Argus and Dr. Bob Dorn, experts in the genus Salix, recently informed us of a historic 1913 collection of Salix arizonica from the Dixie National Forest in southern Utah. No recent collections of this species have been made from Utah. However, some of the suitable habitat on the Dixie and Manti-LaSal National Forests are not well known botanically and there is a high likelihood the willow is still present.

Because of the proposed rule to list this species under the Endangered Species Act (ESA) and the requirements under Section 7 of ESA we are trying to assemble as much information on the species as possible to assist us in completing surveys this year. Dr. Argus suggested we contact Eric Ganfelt for information on the willow and it is through Eric that we became aware of your populations and the possibility of visiting a few of these sites.

Your assistance at this time would be a tremendous help to us in getting a better idea of the specific habitats the species occupies and the morphology of the willow. This would better enable us to train field crews completing the surveys starting in early July. If we can find additional populations on the Dixie NF and also the Manti-LaSal these data would be very important in the Fish and Wildlife Service final rulemaking process. If a significant number of populations are located in Utah this should result in less stringent protection requirements for the Arizona populations...

If you are amenable to hosting a field trip we would like to propose the following: 1) Utah Forest Service botanists would travel to Arizona June 27th and be available for a trip(s) June 28-29th on the White Mountain Apache Tribal Lands, 2) Utah Forest Service participants would be myself (Intermountain Regional Botanist), Ron Rodriguez (Dixie National Forest TES Coordinator), Dave Whittekiend (Dixie National Forest Botanist), and Robert Thompson (Manti-LaSal National Forest Botanist), 3) if permissible we would like to take photographs of the species and notes on its habitat and species morphology, 4) we would secure lodging in Pinetop, Arizona the night of June 27 and 28th. Any other participants would be at your discretion.

If these dates conflict with your schedule we can adjust accordingly. We have the entire week available or could come at another time. Our field crews will be starting July 5 and so the week of June 27-July 1 would work best for us. I have enclosed a copy of the label information for the Utah collection of Salix arizonica.

File Code: 2670
Route To:

Date: November 9, 1994

Subject: Interagency Conservation Strategy/Agreement for Arizona Willow

To: Forest Supervisor's Dixie, Fishlake, and Apache Sitgreaves NF's

Our Fish, Wildlife, and Rare Plant Directors have briefed us on your September 26 meeting in Albuquerque and the October 12-13 meeting in Flagstaff, Arizona, with the U.S. Fish and Wildlife Service (FWS).

We appreciate your strong commitment to work with the FWS in developing legal, and other protective mechanisms, that remove threats to Arizona willow which will prevent the need for federal listing.

We are aware of the tight time frames (December 15, 1994 and April 30, 1995) required to immediately implement the actions discussed and agreed on. Good working relationships, coordination and trust will be key components for this to succeed.

Implementation of these actions and development of the conservation strategy and agreement will require a commitment of time, personnel and funds. It is our understanding that Tom Subridge, Ron Rodriguez and Robert Campbell will be key Forest players in developing the conservation strategy and providing technical support for implementing specific actions needed on your Forest.

We would like monthly updates on the progress being made. You have our full support and the assistance of our Regional botanists in this important conservation effort. The success of this effort goes beyond the conservation of the Arizona willow, for you are "Breaking New Ground" in our cooperative efforts to conserve species. Your efforts will serve as a "blueprint" for conservation of other species and ecosystems. It also will serve as a major effort to implement the intent of our recently signed National MOU for species conservation.

/s/ Jack A. Blackwell (for)
DALE N. BOSWORTH
Regional Forester,
Intermountain Region

/s/ Charles W. Cartwright, Jr.
CHARLES W. CARTWRIGHT, JR.
Regional Forester,
Southwestern Region

cc:
Fish & Wildlife Service, Phoenix, AZ
Fish & Wildlife Service, Albuquerque, NM
Fish & Wildlife Service, Salt Lake City, UT
L.Fisher:r03a
D.Atwood:r04a

D.Atwood:DDE: 10/20/94

Reply to: 2670

Date: MAR 08 1994

Subject: Proposed Rule to List Salix arizonica as an Endangered Species

To: Utah Forest Supervisors

In November 1992, the U.S. Fish and Wildlife Service (FWS) published a proposed rule to list Arizona willow (Salix arizonica Dorn) as endangered (hard copy being sent under separate cover).

Based on data available to the FWS in preparing the proposed rule, this species was thought to occur only in Apache County, Arizona. However, in the summer of 1993, Dr. George Argus identified a specimen from the Forest Service National collection as this species while working on a treatment of Salicaceae for the Flora of North America. This specimen was collected in the early 1900's from the Sevier National Forest at 10,500 feet elevation. The Sevier National Forest is currently that area administered by the Powell RD, Dixie National Forest.

Current data on this species from Arizona documents occurrences at elevations above 8,500 feet in wet meadows, streamsides and cienegas. Most plants have been found in or adjacent to perennial water. Populations also occur in meadows adjacent to forest edges or meadows with sparse stands of Engelmann spruce, and in drier sites in riparian areas.

Based on the historic collection from Utah and the above habitat data from Arizona populations, suitable habitat for this species occurs on the Utah Forests, primarily the Dixie and Manti-LaSal NF's. The disjunct distribution of this species in Arizona and southern Utah is not an unusual pattern for high elevation riparian plants. Primary suitable habitat in Utah would be habitats similar to those in Arizona above 8,500 feet. Areas in Utah where this species is mostly likely to occur would be all of the Dixie National Forest where the above habitat conditions and the following indicator species are present. Areas on the Manti-LaSal NF would be the Abajo and LaSal Mountains in the southern part of the Forest.

Key indicator plant species associated with the Arizona populations which also occur in southern Utah are Salix monticola, S. geyerana, Picea pungens, Potentilla fruticosa, P. diversifolia, Deschampsia caespitosa, Festuca ovina and associated Carex species.

Due to the scarcity of data on the Utah "Sevier Forest" collection, Utah is not being designated as critical habitat at this time and will not be included in the final rule (Brent Palmer FWS pers. comm. March 94).

Primary threats to the species have been identified as livestock grazing, timber harvesting, road building and rust disease on plants with low vigor.

Some, if not all, suitable habitat in southern Utah will be included within the historic range of Arizona willow (Brent Palmer and Larry England, FWS pers. comm. March 1994).

Arizona willow is mostly a small, prostrate shrub from a few inches to 2 feet tall (up to a meter + in some vigorous, healthy plants). Key characters for identification are the leaves and current year's growth. The leaves are heart-shaped, with fine serrations along the leaf margins and a cordate base. The cordate-base is not evident until about mid-growth. The current year's stems are bright red but become lighter as the season progresses. The stems commonly have 2-6 leaves. This species is related to and can be confused with S. boothii in morphology.

Current status of Arizona willow is still a proposed species for listing as endangered. The FWS has not completed the economic analysis for the proposed rule. Apparently a draft final rule has been prepared but is not being circulated outside the FWS at this time.

Current policy and ESA requirements apply to this species and any suitable habitat. A biological assessment will need to be completed for any project or other action in these suitable habitat areas.

If you have questions on this species or have need for further assistance, contact Duane Atwood (801-625-5599 or D.Atwood:R04a).

/s/ Paul W. Shields

For

WILLIAM R. BURBRIDGE

Director

Fisheries and Wildlife Management

cc:

FWS - England

Palmer

RF - Joslin

DRF - Cartwright

R&W - Winward

TM

FWL:Atwood:gsw:3/8/94

United States
Department of
Agriculture

Forest
Service

Intermountain
Region

324 25th Street
Ogden, UT 84401-2310

Reply to: 2670

Date: Sept. 19, 1994

Subject: Management of Proposed Arizona Willow Habitats and Riparian Areas in
General on the Sevenmile Allotment, Fishlake NF

To: Forest Supervisor, Fishlake NF

Enclosed is information you requested at our August 24 meeting at your office to assist in making sound decisions on the Sevenmile Allotment. This information is based on pertinent natural resource data concerning the needs of healthy ecosystems. Also enclosed is a short summary of how and why our office became involved with this issue, as well as, recommendations concerning resolution of this issue.

We commend your efforts to instigate management approaches that have potential for correcting existing resource issues in this area, and will conserve the Arizona willow and the southwestern willow flycatcher, both of which are proposed for listing under the Endangered Species Act.

Preliminary measurements seem to indicate the ecological status in the Sevenmile allotment is early seral with one sample being late seral. These data are still being summarized but show the need for additional measurements to determine and document resource conditions in the entire drainage. We recommend additional measurements be made, both in the upland and riparian areas. Measurements may include: Greenline, Cross Section, Woody Species Regeneration and Utilization in the riparian areas and Nested Frequency, Site Analysis and Utilization in the uplands. We recommend continuous use grazing not be used; it does not work in our Region. Deferred and rest rotation systems are much more effective.

Our agency is committed to being a partner with the U.S. Fish and Wildlife Service and other agencies in the conservation of rare species and in preventing our actions from negatively impacting the viability of these species and their habitats. With the imminent threat to the Arizona willow, it is imperative that we provide adequate protection to known or suspected populations of these species, as well as, areas that may serve as suitable habitat for them. Since these and other species are part of whole ecosystems in this area, anything you do should address the long term needs of the entire Sevenmile ecosystem.

/s/ Robert W. Hamner for

DALE N. BOSWORTH
Regional Forester

Enclosures

REQUESTED RECOMMENDATIONS

Recommendations for LONG TERM Management of the Resources:

1. Vegetative communities will be managed for trends toward and maintenance of desired conditions. Desired conditions are described for riparian and the upland habitats where shrubs and herbaceous vegetation are prominent.

A. Riparian: key species for the identified riparian complex (herbaceous and/or woody) are present, reproducing, and are in high vigor in root, stem, and leaf length and basal area. (See Key Species List)

At least 85 percent ground cover in the riparian area, with 75 percent of the species being those of late seral ecological status for the complex in order to achieve watershed and desirable habitat for riparian dependent species goals.

At least 95 percent of natural soil productivity is maintained. To meet this standard, a minimum of 90 percent of an activity area must be in a nondetrimentally disturbed condition, as defined by loss of biomass production caused by increased soil compaction, displacement, or puddling. Total soil resource commitment should not exceed 3 percent.

Streambanks should be at least 75 percent covered with native hydric and mesic species and/or rock characteristic of the complex.

Age class distribution of tall willows will include at least 25 percent of willows in the seedling/young age classes. Low to mid size willows (Arizona willow and wolf's willow) will be producing and maintaining healthy clones demonstrated by typical size, vigor, annual leader and catkin growth and production of viable seeds.

B. Uplands: Perennial grasses and desirable forbs will be maintained as the dominant understory species. Maintain mosaic of seral stages in the shrub and tree species in adjacent upland communities. Manage for at least 50% in either the late or Potential Natural Communities (PNC) seral ecological status. (See Key Species List)

2. Utilization Standards: We recommend adding a 6 inch stubble height, at the end of the growing season, to the Forest Plan Standards. Stubble height values will take precedence over percent utilization in monitoring.

Where this is different from the current Allotment Management Plan (AMP) and Forest Standards and Guidelines; appropriate involvement (e.g. interdisciplinary, public, permittees ...) and analysis must be conducted to make a quality decision (NEPA will be necessary and should begin immediately if decision is to be implemented next year).

Vigor on willow species should be monitored by measuring changes in cover, clone size, leader length at the end of the growing season, catkin and viable seed production per stem.

The use of ungulates in the Seven Mile drainage will be monitored and managed to provide for the desired conditions. Livestock and Big Game Management Plans will implement the requirements to achieve and maintain the described desired condition. Fenced exclosures may be necessary to quantify and qualify seasons and amount of use by species.

3. Long term actions should look at a "whole" ecosystem (for this AMP at least the size of the AMP, including NFS and other Public Lands).

Recommendations for SHORT TERM Management of the Resources:

1. All fence alternatives provide adequate protection for suitable Arizona Willow habitats in Sevenmile drainage (see enclosed maps/aerial photos and overlays).
2. All fence alternatives address Southwestern Willow Flycatcher (SWWF) potential habitats and potential impacts.
3. Fishlake NF complete surveys for Arizona Willow on the rest of the Forest (suitable habitats) this year before willows lose their leaves (generally frost initiates leaf drop).
4. Decision to fence can be covered by a Catagorical Exclusion 31.1b 1 "Orders issued pursuant to 36 CFR Part 261 - Prohibitions to provide short-term resource protection or to protect public health and saftey" (from FSH 1909.15 enclosed) provided further analysis, documentation and involvement (probably NEPA EA) is carried out to analyze effects of fence (e.g. better resource conditions and recovery, probable reductions in livestock numbers).

Conservation Measures identified by FWS to eliminate threats to Arizona willow

Short Term:(or immediate needs)

1. For all timber activities, in known or suitable Arizona willow habitat, establish a minimum of a 100 foot buffer (e.g., leave tree densities to benefit willows, no felling toward stream or willows). May need to periodically thin timber stands when they reach 30-60% canopy closure to maintain suitable habitat for the willows.
2. Construct a 3-way ungulate exclosure to determine elk and cattle use on Arizona willow.
3. Construct and maintain a riparian pasture the length and width of the Sevenmile riparian areas that provides protection for Arizona willow and other rare species in the riparian ecosystem.
4. Complete surveys of suitable habitat on the Fishlake to determine northern extent of populations, impacts, habitat condition and protective action needed to maintain species viability.

5. GPS all populations and complete R-4 sensitive species field form for all populations discovered and provide copies to the Natural Heritage Program and the FWS.

6. Establish bench mark areas in the uplands and riparian areas outside the fenced area for measuring ungulate utilization.

7. Develop interagency conservation strategy prior to December 15, 1994 (Larry England, Duane Atwood and Ron Rodriguez are currently working on this).

Long Term

1. If the proposed rule is withdrawn FS will maintain Arizona willow on the RF Sensitive Species List.

2. Complete BA/BE's on all project activities.

3. Designate essential habitat for the Arizona willow under authority of the RF for all areas essential for maintaining species viability.

4. Establish a long-term monitoring program to evaluate population and habitat trends, identify site-specific threats, and track any changes in the status of Arizona willow.

5. Work with Research (FS and University) to complete analysis of chemical and genetic diversity of Arizona willow populations throughout its range prior to designation of essential habitat.

6. Increase botanical expertise at the Forest level to develop and implement appropriate actions needed for Arizona willow and other listed and sensitive species on the Forest.

7. If moose now occupy or migrate into the Sevenmile drainage, establish monitoring studies to determine impacts on Arizona willow and take any actions necessary to eliminate these impacts.

8. As part of the NEPA process amend the Forest Plan to include protective measures and other conservation strategies necessary to protect Arizona willow and its habitat.

9. Designate Arizona willow as a management indicator for drainages on the Dixie and Fishlake National Forests with known or suitable habitat.

10. Ensure riparian fence and exclosure is maintained and in good repair before livestock enter allotments and throughout the grazing season.

11. Fund and implement yearly action tasks identified in the conservation strategy.

12. Develop a dispersed recreation plan for the Sevenmile drainage to reduce or eliminate ORV impacts.

BACKGROUND INFORMATION

The primary reason the Regional Office became involved in management strategies in the Sevenmile area was because the proposed ARIZONA WILLOW was found in this drainage earlier this year. Below is a brief background on the listing actions for this species, key issues and deadlines.

Arizona willow (Salix arizonica) was proposed for listing as endangered, with critical habitat, by the U.S. Fish and Wildlife Service (FWS) in November of 1992. FWS was not aware that the species occurred in Utah when the proposed rule was developed. The FWS was sued by several Arizona conservation groups in the spring of 1993 because the final rule was not published within the required timeframe (one year).

Forest Service R4 became aware of a 1913 historic collection recently identified as Arizona willow on the "Sevier Forest" in Utah during the fall of 1993. Arizona willow surveys on the Dixie NF in late June through August of 1994 resulted in discovery of several populations on the Dixie and Fishlake NF's.

The FWS was notified of the June discovery resulting in a hold of the final rule which was in the FWS Washington Office for final review and publication in the Federal Register. R4 hosted two interagency field trips to Utah to review the new information and the possibility of developing a conservation strategy (CS) rather than list the species.

An interagency technical team representing the FWS, FS, Apache Tribe, AZ Game and Fish, and Research met in Flagstaff on Aug. 12 to review the status of the willow and consider the issues in the development of a CS. The following deadlines and key issues surfaced:

1. By Dec. 15, 1994 the FWS must publish a notice to either withdraw the listing or re-open the comment period for another 30 days to allow Utah to comment. Final decision on listing is due by April 15, 1995
2. The FWS is under a lawsuit for having missed the deadline for listing. They have negotiated with the litigants for more time to consider new information.
3. The FWS will consider withdrawal of the final rule only if specific actions are immediately taken to remove and reduce site-specific threats.
4. The populations on the Apache-Sitgreaves NF are considered to be the most significantly threatened. Aggressive and immediate protection actions by the Apache-Sitgreaves, Dixie, and Fishlake NF's will be the key to whether this species becomes listed or not, especially actions by the Apache-Sitgreaves NF.

Concerns/Actions Needed:

1. Listing of the willow would require considerable cost and staffing for both the FWS and Forest Service to meet Endangered Species Act requirements.

2. Development of a CS would be less costly and should protect all riparian dependent species in the Arizona willow ecosystem.
3. Line Officers will be held accountable for CS implementation
4. Forests must implement protective measures to eliminate threats before December 15, 1994 in order to eliminate need for federal listing by FWS.
5. Short term and long term protective measures will need to be identified and agreed to in an interagency signed conservation agreement prior to April 15, 1995 (see list of conservation measures identified by the FWS to eliminate threats)

Because of the above mentioned issues and deadlines, an informal conferencing trip was scheduled to visit the Sevenmile area and talk about this and other issues. Below are highlights of this trip.

INFORMAL CONFERENCING TRIP TO FISHLAKE NF 8/26/94

Participants:

Dick Farrar	Robert Campbell	Bert Lowry	Gary Laing
Larry England (USFWS)		Ron Rodriguez	Susan Linner (USFWS)
Tina Lanier	Seona Brown	Duane Atwood	Al Winward
Frank Gunnell			

Discussions:

The following topics were generally discussed:

1. General condition of the riparian areas, impacts from cattle, gophers, fishermen, past livestock grazing, elk grazing.
2. Past and present management of the allotment.
3. Reasons and thoughts about Forest request and receipt of \$50,000 to build a fence in the Sevenmile area.
4. Continuing controversy surrounding Sevenmile area.
5. Possible impacts to livestock permittees, and previous discussions with them regarding this allotment and potential solutions.
6. Opportunity to do an ecosystem approach to manage the riparian system as a whole, reduce expected impacts to uplands, reduce probable future fencing needs because of general condition of aquatic/riparian system in the area and probable failure of "corridor fence" to solve some of these problems.
7. Lack of range administration and lack of compliance by permittees.

Decisions or Actions Discussed/Needed:

1. Dick Farrar will brief FS on field tour. [done]

2. Forest Supervisor will discuss need for help with Dixie FS. [done]
3. If Ron Rodriguez is available we could GPS populations of Salix arizonica SW willow Flycatcher and the boundary for an ecosystem/corridor fence with possible assistance of Duane Atwood and Larry England. [done]
4. FWS draft strategy for protection and implementation of conservation strategy identifies the need for the Dixie, Apache-Sitgreaves, and Fishlake NF's to acquire botanical skills in order to implement the strategy and complete yearly monitoring studies.
5. FWS conservation measures require designation of essential habitat for Salix arizonica on the Apache-Sitgreaves, Dixie, and Fishlake NF's. These will require Regional Forester's signature's.
6. Duane Atwood will contact Bob Thompson to confirm his assistance. 8/30-31 [done]
7. RO review aerial photo work of Sevenmile done by Andy Godfrey. [done]
8. Al Winward provide summary of pros and cons on riparian ecosystem vs corridor fence in Sevenmile. [see below]
9. Bob Campbell to review forest plan standards for grazing in Sevenmile and provide summary to RO. [done]
10. Forest will set up a meeting with the grazing association to reach a decision on the fence locations and grazing in Sevenmile.
11. District will build exclosures this fall and buy fencing material for entire Sevenmile fence this fall.
12. Forest will build Sevenmile fence before next grazing season and or before the livestock go on in 1995.
13. A ecosystem fence would be best but hard to sell to the grazing association; they would prefer to corridor fence part of riparian area.

Background Information:

1. Uplands at location visited were producing about 900 lbs/ac, with 1500 to 2500 lbs/ac potential. An estimated ninety percent of plants present are undesirable species (invader or increaser species that increase with excessive grazing pressure) resulting in production of desirable forage of about 10 percent of potential.
2. Uplands are generally in an early seral stage and with current yearly grazing, insufficient litter is present to carry a fire.

3. Fire history shows fire cycle of about every 20-25 years in adjacent conifer but due to fire suppression this has not occurred in the past 100 years.

4. Forest plan standards for the uplands for a range in fair condition is 40% use of key species and 22% use on total vegetation. The standard for riparian areas in fair condition is 30% utilization rather than the 60-90% estimated for this years use to date.

5. If riparian and upland sites we visited in the allotment are representative of the overall allotment, then it is overstocked for current carrying capacity.

TWO (CONCEPTUAL) ALTERNATIVES PROPOSED FOR FENCE

ECOSYSTEM RECOVERY APPROACH (Fence major riparian area separate from uplands)

PROS

- Correct thing to do as it follows FS direction to manage based on ecosystem management concepts.
- Considers entire riparian ecosystem being impacted and is a better long term decision
- Is less expensive and considers not only the Arizona willow and SW willow flycatcher but all species present or that may be present in the general area.
- Better long term decision
- Greater opportunity to improve the hydrology for the entire 7-mile riparian system.
- Provides more suitable habitat for multiple species especially neotrop's.
- Greater potential for using intermittent livestock grazing, after restoration, as a tool in riparian management.
- Fencing of entire riparian area could result in a more rapid increase of the water table.
- Will protect some lateral seeps and drainages which will contribute to increase in water table and spread water over upper reaches and edges of riparian areas.
- Provide easier range administration and better visuals for the public.
- Would not require as intensive field surveys for Arizona willow or SW willow flycatcher this fall.
- Could increase fisheries resources quicker.

CONS

- More expensive in short term (FY 94-95)
- Will require greater reduction in livestock numbers during recovery period or shorter annual seasons-or both.
- Greater difficulty in getting agreement on fence line locations.
- Will cause change in historic grazing patterns.
- Will require more knowledge about the whole drainage, i.e. carrying capacity in the rest of the unfenced area.
- May require changes in the AMP and yearly operating plan.
- Will require yearly monitoring.
- Require more fence maintenance than presently done by permittees or Forest.

CORRIDOR APPROACH (Fence a narrow portion of the riparian area)

PROS

- Cheaper to build in the short term (FY 94-95)
- More palatable to grazing association and easier for Ranger to sell to due to less reduction in livestock numbers.
- Meets immediate needs for protecting Arizona willow, providing surveys are completed immediately and fences protect essential habitat.
- Can be completed with less cost and time
- Is in line with last discussions with grazing association by the Forest.
- Easier range administration than currently used since cattle won't have to be herded out of riparian areas constantly.

CONS

- Fence would probably need to be changed within the next few years due to discovery of many more riparian dependent species on the edge of listing, (e.g., in Arizona/New Mexico 120-130 riparian dependent species will probably be petitioned for listing). Fishlake habitats are similar and we would probably have to address these issues.
- Will not protect entire riparian area and may still have undesirable conditions and stream damage, especially on lateral seeps and streams outside the fenced areas.
- Requires more fence maintenance then previously done by permittees or Forest personnel.
- Will require immediate surveys for Arizona willow and time to GPS populations of willow and SW willow flycatcher.

Some Assumptions

1. What ever fence is built it will be effective in stopping impacts in the excluded areas.
2. Forest will determine carrying capacity outside fenced area before 1995 grazing season
3. Forest will complete annual monitoring in 3 way exclosure to determine ungulate use (elk/cattle and possibly moose).
4. If excessive elk or moose use is documented appropriate actions will be taken to reduce numbers or impacts (will require coordination with state).
5. Forest will do appropriate range administration to achieve proper use standards.
6. District will ensure livestock are removed when "proper use" is reached.

Decisions Made During the August 24-25 RO Trip to Fishlake and Sevenmile

1. Crews from Dixie, Manti-LaSal, NPS, Forest, and RO will help survey suitable Arizona willow habitat and work on level III riparian classification,

nested frequency and site analysis studies. RO will provide Forest with results of work completed on August 25.

2. RO will make recommendations and provide Forest recommendations from FWS on utilization standards, DFC's of Sevenmile and other protective actions for Arizona willow and SW willow flycatcher.

3. Forest will GPS populations of Arizona willow this fall.

4. Bert Lowery will map suitable habitat for the SW willow flycatcher.

5. Forest will complete the rest of the nested frequency studies (2 more).

6. Forest would use prior data on the level III riparian studies, soils, fisheries, and hydrology, along with the recent studies to determine current resource conditions and establish DFC's for the Sevenmile drainage. These data would be used to review and adjust grazing that will provide resource restoration.

7. Forest will build fences and ungulate exclosures this fall.

Studies Completed on August 25, 1994

1. Three green lines and cross sections in the Sevenmile riparian area.

2. One nested frequency in lower Sevenmile.

3. Three site analysis studies to determine ecological condition.

4. Willow surveys in approximately 1/2 of Sevenmile.

5. Mapping of known and suitable willow habitat.

6. Map of proposed fence line to protect Arizona willow and SW willow flycatcher habitat.

Key Indicator Species for Riparian Areas and Uplands

Riparian areas - Carex aquatilis, Deschampsia caespitosa, Salix arizonica
Uplands - Festuca idahoensis, Bromus carinatus, Elymus trachycaulus
(previously Agropyron trachycaulum)

Key species listed in the Seven Mile Allotment Management Plan (1986):

Slender wheatgrass

Mountain brome

Idaho fescue

Tufted hairgrass

Water sedge



File Code: 2670
Route To:

Date: April 19, 1995

Subject: Regional Forester Sensitive Species List

To: Station Director, INT; and Forest Supervisors

Arizona Willow, a proposed endangered species, was located on the Dixie and Fishlake National Forests in 1994. This species is located in high elevation (8600-10,800 feet) riparian ecosystems.

A conservation agreement (CA) and conservation strategy (CS) has been completed by an interagency technical committee established by the R3 and R4 Regional Foresters and Fish and Wildlife Service (FWS). These conservation documents form the basis of a FWS Federal Register Notice to withdraw the proposed rule to list the species as endangered. The proposed withdrawal rule is scheduled for publication in April 1995.

Two of the immediate actions identified for completion in the conservation agreement and strategy for species protection in R4 are adding the Arizona Willow to the Regional Forester's Sensitive Species List, and designation of essential habitat (as defined in FSM 2670). Region 3 currently recognizes this species as a Regional Forester sensitive species. These two actions are key components that help FWS justify a withdrawal proposal.

Arizona Willow meets the two sensitive species listing criteria described in FSM 2670 and is being added to the Regional Forester's list as sensitive. This designation will be effective after the withdrawal rule by the FWS is published and the "proposed status" is no longer in affect. Endangered Species Act requirements are still applicable until after the effective date of the withdrawal, after which time FSM 2670 Sensitive Species requirements will apply.

Because Utah contains the largest Arizona Willow populations, designation and maintenance of essential habitat in Utah is critical to the protection of the species. Chromotography and DNA analysis will be completed in 1995 on populations throughout its range to determine the species genetic diversity. These analysis will be one of the primary data sources used by the Interagency Technical Committee for recommending essential habitat designations.

Recommendations for additions, deletions, and corrections to the current sensitive plant list have been received from several Forests. In order to keep this list current, please forward any additional recommendations (with documentation) for changes to the plant list to Duane Atwood in the Regional Office (DG address: R04A) by May 10. The Plant list was last revised in April 1994, so the intent of this request, is not to initiate a major revision but to make additions and deletions based on new information collected since April of last year.

Robert W. Hamner, for

DALE N. BOSWORTH
Regional Forester



The use of ungulates in the Seven Mile drainage will be monitored and managed to provide for the desired conditions. Livestock and Big Game Management Plans will implement the requirements to achieve and maintain the described desired condition. Fenced exclosures may be necessary to quantify and qualify seasons and amount of use by species.

3. Long term actions should look at a "whole" ecosystem (for this AMP at least the size of the AMP, including NFS and other Public Lands).

Recommendations for SHORT TERM Management of the Resources:

1. All fence alternatives provide adequate protection for suitable Arizona Willow habitats in Sevenmile drainage (see enclosed maps/aerial photos and overlays).
2. All fence alternatives address Southwestern Willow Flycatcher (SWWF) potential habitats and potential impacts.
3. Fishlake NF complete surveys for Arizona Willow on the rest of the Forest (suitable habitats) this year before willows lose their leaves (generally frost initiates leaf drop).
4. Decision to fence can be covered by a Catagorical Exclusion 31.1b 1 "Orders issued pursuant to 36 CFR Part 261 - Prohibitions to provide short-term resource protection or to protect public health and saftey" (from FSH 1909.15 enclosed) provided further analysis, documentation and involvement (probably NEPA EA) is carried out to analyze effects of fence (e.g. better resource conditions and recovery, probable reductions in livestock numbers).

Conservation Measures identified by FWS to eliminate threats to Arizona willow

Short Term:(or immediate needs)

1. For all timber activities, in known or suitable Arizona willow habitat, establish a minimum of a 100 foot buffer (e.g., leave tree densities to benefit willows, no felling toward stream or willows). May need to periodically thin timber stands when they reach 30-60% canopy closure to maintain suitable habitat for the willows.
2. Construct a 3-way ungulate exclosure to determine elk and cattle use on Arizona willow.
3. Construct and maintain a riparian pasture the length and width of the Sevenmile riparian areas that provides protection for Arizona willow and other rare species in the riparian ecosystem.
4. Complete surveys of suitable habitat on the Fishlake to determine northern extent of populations, impacts, habitat condition and protective action needed to maintain species viability.

5. GPS all populations and complete R-4 sensitive species field form for all populations discovered and provide copies to the Natural Heritage Program and the FWS.

6. Establish bench mark areas in the uplands and riparian areas outside the fenced area for measuring ungulate utilization.

7. Develop interagency conservation strategy prior to December 15, 1994 (Larry England, Duane Atwood and Ron Rodriguez are currently working on this).

Long Term

1. If the proposed rule is withdrawn FS will maintain Arizona willow on the RF Sensitive Species List.

2. Complete BA/BE's on all project activities.

3. Designate essential habitat for the Arizona willow under authority of the RF for all areas essential for maintaining species viability.

4. Establish a long-term monitoring program to evaluate population and habitat trends, identify site-specific threats, and track any changes in the status of Arizona willow.

5. Work with Research (FS and University) to complete analysis of chemical and genetic diversity of Arizona willow populations throughout its range prior to designation of essential habitat.

6. Increase botanical expertise at the Forest level to develop and implement appropriate actions needed for Arizona willow and other listed and sensitive species on the Forest.

7. If moose now occupy or migrate into the Sevenmile drainage, establish monitoring studies to determine impacts on Arizona willow and take any actions necessary to eliminate these impacts.

8. As part of the NEPA process amend the Forest Plan to include protective measures and other conservation strategies necessary to protect Arizona willow and its habitat.

9. Designate Arizona willow as a management indicator for drainages on the Dixie and Fishlake National Forests with known or suitable habitat.

10. Ensure riparian fence and exclosure is maintained and in good repair before livestock enter allotments and throughout the grazing season.

11. Fund and implement yearly action tasks identified in the conservation strategy.

12. Develop a dispersed recreation plan for the Sevenmile drainage to reduce or eliminate ORV impacts.

BACKGROUND INFORMATION

The primary reason the Regional Office became involved in management strategies in the Sevenmile area was because the proposed ARIZONA WILLOW was found in this drainage earlier this year. Below is a brief background on the listing actions for this species, key issues and deadlines.

Arizona willow (Salix arizonica) was proposed for listing as endangered, with critical habitat, by the U.S. Fish and Wildlife Service (FWS) in November of 1992. FWS was not aware that the species occurred in Utah when the proposed rule was developed. The FWS was sued by several Arizona conservation groups in the spring of 1993 because the final rule was not published within the required timeframe (one year).

Forest Service R4 became aware of a 1913 historic collection recently identified as Arizona willow on the "Sevier Forest" in Utah during the fall of 1993. Arizona willow surveys on the Dixie NF in late June through August of 1994 resulted in discovery of several populations on the Dixie and Fishlake NF's.

The FWS was notified of the June discovery resulting in a hold of the final rule which was in the FWS Washington Office for final review and publication in the Federal Register. R4 hosted two interagency field trips to Utah to review the new information and the possibility of developing a conservation strategy (CS) rather than list the species.

An interagency technical team representing the FWS, FS, Apache Tribe, AZ Game and Fish, and Research met in Flagstaff on Aug. 12 to review the status of the willow and consider the issues in the development of a CS. The following deadlines and key issues surfaced:

1. By Dec. 15, 1994 the FWS must publish a notice to either withdraw the listing or re-open the comment period for another 30 days to allow Utah to comment. Final decision on listing is due by April 15, 1995
2. The FWS is under a lawsuit for having missed the deadline for listing. They have negotiated with the litigants for more time to consider new information.
3. The FWS will consider withdrawal of the final rule only if specific actions are immediately taken to remove and reduce site-specific threats.
4. The populations on the Apache-Sitgreaves NF are considered to be the most significantly threatened. Aggressive and immediate protection actions by the Apache-Sitgreaves, Dixie, and Fishlake NF's will be the key to whether this species becomes listed or not, especially actions by the Apache-Sitgreaves NF.

Concerns/Actions Needed:

1. Listing of the willow would require considerable cost and staffing for both the FWS and Forest Service to meet Endangered Species Act requirements.

2. Development of a CS would be less costly and should protect all riparian dependent species in the Arizona willow ecosystem.
3. Line Officers will be held accountable for CS implementation
4. Forests must implement protective measures to eliminate threats before December 15, 1994 in order to eliminate need for federal listing by FWS.
5. Short term and long term protective measures will need to be identified and agreed to in an interagency signed conservation agreement prior to April 15, 1995 (see list of conservation measures identified by the FWS to eliminate threats)

Because of the above mentioned issues and deadlines, an informal conferencing trip was scheduled to visit the Sevenmile area and talk about this and other issues. Below are highlights of this trip.

INFORMAL CONFERENCING TRIP TO FISHLAKE NF 8/26/94

Participants:

Dick Farrar	Robert Campbell	Bert Lowry	Gary Laing
Larry England (USFWS)		Ron Rodriguez	Susan Linner (USFWS)
Tina Lanier	Seona Brown	Duane Atwood	Al Winward
Frank Gunnell			

Discussions:

The following topics were generally discussed:

1. General condition of the riparian areas, impacts from cattle, gophers, fishermen, past livestock grazing, elk grazing.
2. Past and present management of the allotment.
3. Reasons and thoughts about Forest request and receipt of \$50,000 to build a fence in the Sevenmile area.
4. Continuing controversy surrounding Sevenmile area.
5. Possible impacts to livestock permittees, and previous discussions with them regarding this allotment and potential solutions.
6. Opportunity to do an ecosystem approach to manage the riparian system as a whole, reduce expected impacts to uplands, reduce probable future fencing needs because of general condition of aquatic/riparian system in the area and probable failure of "corridor fence" to solve some of these problems.
7. Lack of range administration and lack of compliance by permittees.

Decisions or Actions Discussed/Needed:

1. Dick Farrar will brief FS on field tour. [done]

2. Forest Supervisor will discuss need for help with Dixie FS. [done]
3. If Ron Rodriguez is available we could GPS populations of Salix arizonica SW willow Flycatcher and the boundary for an ecosystem/corridor fence with possible assistance of Duane Atwood and Larry England. [done]
4. FWS draft strategy for protection and implementation of conservation strategy identifies the need for the Dixie, Apache-Sitgreaves, and Fishlake NF's to acquire botanical skills in order to implement the strategy and complete yearly monitoring studies.
5. FWS conservation measures require designation of essential habitat for Salix arizonica on the Apache-Sitgreaves, Dixie, and Fishlake NF's. These will require Regional Forester's signature's.
6. Duane Atwood will contact Bob Thompson to confirm his assistance. 8/30-31 [done]
7. RO review aerial photo work of Sevenmile done by Andy Godfrey. [done]
8. Al Winward provide summary of pros and cons on riparian ecosystem vs corridor fence in Sevenmile. [see below]
9. Bob Campbell to review forest plan standards for grazing in Sevenmile and provide summary to RO. [done]
10. Forest will set up a meeting with the grazing association to reach a decision on the fence locations and grazing in Sevenmile.
11. District will build exclosures this fall and buy fencing material for entire Sevenmile fence this fall.
12. Forest will build Sevenmile fence before next grazing season and or before the livestock go on in 1995.
13. A ecosystem fence would be best but hard to sell to the grazing association; they would prefer to corridor fence part of riparian area.

Background Information:

1. Uplands at location visited were producing about 900 lbs/ac, with 1500 to 2500 lbs/ac potential. An estimated ninety percent of plants present are undesirable species (invader or increaser species that increase with excessive grazing pressure) resulting in production of desirable forage of about 10 percent of potential.
2. Uplands are generally in an early seral stage and with current yearly grazing, insufficient litter is present to carry a fire.

3. Fire history shows fire cycle of about every 20-25 years in adjacent conifer but due to fire suppression this has not occurred in the past 100 years.
4. Forest plan standards for the uplands for a range in fair condition is 40% use of key species and 22% use on total vegetation. The standard for riparian areas in fair condition is 30% utilization rather than the 60-90% estimated for this years use to date.
5. If riparian and upland sites we visited in the allotment are representative of the overall allotment, then it is overstocked for current carrying capacity.

TWO (CONCEPTUAL) ALTERNATIVES PROPOSED FOR FENCE

ECOSYSTEM RECOVERY APPROACH (Fence major riparian area separate from uplands)

PROS

- Correct thing to do as it follows FS direction to manage based on ecosystem management concepts.
- Considers entire riparian ecosystem being impacted and is a better long term decision
- Is less expensive and considers not only the Arizona willow and SW willow flycatcher but all species present or that may be present in the general area.
- Better long term decision
- Greater opportunity to improve the hydrology for the entire 7-mile riparian system.
- Provides more suitable habitat for multiple species especially neotrop's.
- Greater potential for using intermittent livestock grazing, after restoration, as a tool in riparian management.
- Fencing of entire riparian area could result in a more rapid increase of the water table.
- Will protect some lateral seeps and drainages which will contribute to increase in water table and spread water over upper reaches and edges of riparian areas.
- Provide easier range administration and better visuals for the public.
- Would not require as intensive field surveys for Arizona willow or SW willow flycatcher this fall.
- Could increase fisheries resources quicker.

CONS

- More expensive in short term (FY 94-95)
- Will require greater reduction in livestock numbers during recovery period or shorter annual seasons-or both.
- Greater difficulty in getting agreement on fence line locations.
- Will cause change in historic grazing patterns.
- Will require more knowledge about the whole drainage, i.e. carrying capacity in the rest of the unfenced area.
- May require changes in the AMP and yearly operating plan.
- Will require yearly monitoring.
- Require more fence maintenance than presently done by permittees or Forest.

CORRIDOR APPROACH (Fence a narrow portion of the riparian area)

PROS

- Cheaper to build in the short term (FY 94-95)
- More palatable to grazing association and easier for Ranger to sell to due to less reduction in livestock numbers.
- Meets immediate needs for protecting Arizona willow, providing surveys are completed immediately and fences protect essential habitat.
- Can be completed with less cost and time
- Is in line with last discussions with grazing association by the Forest.
- Easier range administration than currently used since cattle won't have to be herded out of riparian areas constantly.

CONS

- Fence would probably need to be changed within the next few years due to discovery of many more riparian dependent species on the edge of listing, (e.g., in Arizona/New Mexico 120-130 riparian dependent species will probably be petitioned for listing). Fishlake habitats are similar and we would probably have to address these issues.
- Will not protect entire riparian area and may still have undesirable conditions and stream damage, especially on lateral seeps and streams outside the fenced areas.
- Requires more fence maintenance then previously done by permittees or Forest personnel.
- Will require immediate surveys for Arizona willow and time to GPS populations of willow and SW willow flycatcher.

Some Assumptions

1. What ever fence is built it will be effective in stopping impacts in the excluded areas.
2. Forest will determine carrying capacity outside fenced area before 1995 grazing season
3. Forest will complete annual monitoring in 3 way exclosure to determine ungulate use (elk/cattle and possibly moose).
4. If excessive elk or moose use is documented appropriate actions will be taken to reduce numbers or impacts (will require coordination with state).
5. Forest will do appropriate range administration to achieve proper use standards.
6. District will ensure livestock are removed when "proper use" is reached.

Decisions Made During the August 24-25 RO Trip to Fishlake and Sevenmile

1. Crews from Dixie, Manti-LaSal, NPS, Forest, and RO will help survey suitable Arizona willow habitat and work on level III riparian classification,

**ARIZONA WILLOW
CONSERVATION AGREEMENT AND STRATEGY**

APPENDIX E

**ARIZONA WILLOW PROPOSED RULE
(57 FR 54747)**

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN 1018-AB83

Endangered and Threatened Wildlife
and Plants; Proposed Endangered
Status for the Plant "*Salix arizonica*"
(Arizona willow); with Critical Habitat

AGENCY: Fish and Wildlife Service,
Interior.

ACTION: Proposed rule.

SUMMARY: The Fish and Wildlife Service (Service) proposes to list the plant *Salix arizonica* (Arizona willow) as an endangered species with critical habitat under the authority of the Endangered Species Act of 1973, as amended (Act). This riparian plant occurs in low numbers and is endemic to the slopes of Mt. Baldy, the highest peak in the White Mountains of Arizona. It is threatened by livestock and wildlife grazing, habitat degradation and loss, and fungal disease. This proposal, if made final, would implement Federal protection provided by the Act for Arizona willow. The Service seeks data and comments from the public on the proposed rule.

DATES: Comments from all interested parties must be received by January 19, 1993. Public hearing requests must be received by January 4, 1993.

ADDRESSES: Comments and materials concerning this proposal should be sent to the Field Supervisor, Ecological Services Field Office, U.S. Fish and Wildlife Service, 3616 W. Thomas, suite 6, Phoenix, Arizona 85019. Comments and materials received will be available for public inspection, by appointment, during normal business hours at the above address.

FOR FURTHER INFORMATION CONTACT: Sue Rutman, at the above address (Telephone: 602/379-4720 or FTS 281-4720).

SUPPLEMENTARY INFORMATION:

Background

Dorn (1975) described the species *Salix arizonica* from specimens collected by Granfelt, who recognized them as distinct in 1969 (Galeano-Popp 1988). Arizona willow is a shrub, up to 0.5 meter (1.5 feet) high, with ovate leaves and red stems. Leaves are 1-4.5 centimeters (0.4-1.8 inches) long, 5-22 centimeters (0.2-0.9 inches) wide, with fine-toothed margins. Leaves are rounded or nearly heart-shaped at the base. Although this species is described as shrubby, it exhibits several forms that include scraggly shrub, rounded shrub, prostrate mat, and large hedge or thicket (Galeano-Popp 1988). The factors responsible for these variations are not understood.

Arizona willow is known only from the White Mountains of Arizona on land managed by the Apache-Sitgreaves National Forest (Forest) and the White Mountain Fort Apache Indian Reservation (Reservation). Although intensive surveys have been conducted on both the Forest and Reservation, the species has been located in only 15 drainages. All Arizona willow plants occur in drainages that trend to the north, east, or south. Sometimes, individuals are widely spaced (more than one mile apart), but occasionally plants are clustered.

The species is found at elevations above 2,600 meters (8,500 feet) in wet meadows, stream sides, and cienegas most commonly in or adjacent to perennial water. Plants are less commonly found in meadows adjacent to forest edges or meadows with sparse stands of spruce. Plants are also found in drier sites within the riparian zone (Galeano-Popp 1988). Species associated with Arizona willow include *Salix monticola* (Serviceberry willow), *Salix geyeriana* (Geyer willow), *Salix hebbiana* (Bebb willow), *Picea pungens*

(blue spruce), *Picea engelmannii* (Engelmann spruce), *Potentilla fruticosa* (shrubby cinquefoil), *Potentilla diversifolia* (cinquefoil), *Mimulus rimuloides* (mat monkeyflower), *Deschampsia caespitosa* (tufted hairgrass) and *Carex* species (sedges) (Galeano-Popp 1988).

Although there are no records of the historic distribution of Arizona willow, unoccupied habitat within the known range does exist. The historical range may have extended approximately two miles further to the east and two miles further to the south (Galeano-Popp 1988). Galeano-Popp (U.S. Forest Service, pers. comm., 1991) and Granfelt (Pinetop, AZ, pers. comm., 1991) believe that all potential habitat has been surveyed and all populations located. The relatively small number of individuals, their rarity within the habitat, and the degraded condition of the habitat indicate the species may have been more common in the past.

Federal government actions on this species began with Section 12 of the Endangered Species Act of 1973 (16 U.S.C. 1531 *et seq.*), which directed the Secretary of the Smithsonian Institution to prepare a report on those plants considered to be endangered, threatened, or extinct. This report, designated as House document No. 94-51, was presented to Congress on January 9, 1975. Arizona willow was included as "threatened" in the 1975 Smithsonian report.

Arizona willow's status as a very localized endemic discovered in 1969 and described in 1975 prompted the inclusion of the species in Category 1 in the December 15, 1980 Federal Register (42 FR 82480) notice of plants under review for threatened or endangered classification. The designation was based on a small population and the threat of degradation of riparian habitat by livestock usage (Fletcher 1978). Category 1 includes those taxa for which the Service has sufficient information on biological vulnerability and threat(s) to support the appropriateness of proposing to list them as endangered or threatened. The November 23, 1983, supplement to the 1980 notice (48 FR 53640) included Arizona willow as a Category 3C species based on an assessment by Phillips, et al. (1982) that the willow was endemic but locally common with all known populations apparently healthy and reproducing. Category 3C includes those taxa that have proven to be more abundant or widespread than previously supposed and/or those that are not subject to any identifiable threat. If further research or changes in habitat indicate significant decline in any of

these taxa, they may be reevaluated for possible inclusion in Category 1 or 2. Arizona willow was placed in Category 2 in the September 27, 1985, Federal Register notice (50 FR 39528) of plants under review for threatened or endangered classification due to further questions concerning vulnerability and threats to the small populations. Category 2 includes those taxa for which there is some evidence of vulnerability, but for which there are not enough data to support listing proposals at this time. A March 1989 report addressing the Arizona willow found on the White Mountain Apache Indian Reservation and a species' status report for the Apache-Sitgreaves National Forest, dated April 1988, prompted the placement of Arizona willow in Category 1 in the February 21, 1990, Federal Register notice (55 FR 8184) of plants under review for threatened or endangered classification. The studies by Galeano-Popp (1988) and Granfelt (1989) presented additional information on vulnerability and threats faced by this species which supported moving the species from Category 2 to Category 1.

All plants included in the comprehensive plant notices are treated as under petition. Section 4(b)(3)(B) of the Act, as amended in 1982, requires the Secretary to make certain findings on pending petitions within 12 months of their receipt. Section 2(b)(1) of the 1982 amendments further required that all petitions pending on October 13, 1982, be treated as having been newly submitted on that date. Because the plants in the December 15, 1980, Federal Register notice, including Arizona willow, were treated as under petition, they were considered to be newly petitioned on October 13, 1982. In 1983, 1984, 1985, 1986, 1987, 1988, 1989, and 1990, the Service found that the petitioned listing of Arizona willow was warranted but precluded by other listing actions of higher priority and that additional data on vulnerability and threats were still being gathered. This proposal constitutes the final 1-year finding as required by the 1982 amendments to the Act.

Summary of Factors Affecting the Species

Section 4(a)(1) of the Endangered Species Act (16 U.S.C. 1531 *et seq.*) and regulations (50 CFR part 424) promulgated to implement the listing provisions of the Act set forth the procedures for adding species to the Federal lists. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section

4(a)(1). These factors and their application to *Salix arizonica* Dorn (Arizona willow) are as follows:

A. The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range

Historic and current livestock grazing in the high elevation riparian meadows on the Forest has contributed to habitat degradation. Livestock have had less of a recent effect on Reservation riparian areas because no livestock grazing has occurred there for a number of years. Livestock overuse of riparian meadows affects the habitat through hydrologic changes, soil compaction, erosion, bank instability, and siltation. Repeated habitat overuse by cattle results in reduced plant vigor and reproductive success, shifts in relative abundance of plant species, and localized loss of plant species. The adverse effects of livestock on the habitat are believed to be the most important factor affecting the populations on the Forest (Galeano-Popp 1988).

Erosion and siltation may adversely affect Arizona willow through their influence on plant vigor and reproductive success (Medina 1990; Tom Subirge, Apache-Sitgreaves National Forest, pers. comm., 1991). The primary source of siltation in Arizona willow habitat on the Forest is probably habitat disturbance from livestock. Another cause of erosion and siltation in Arizona willow habitat is timber harvesting and related activities such as road building in the upper watersheds on the Reservation.

The construction of reservoirs and stock ponds has resulted in the loss of Arizona willow habitat and probably plants, and may have contributed to increased wildlife use within Arizona willow habitat areas. Many of the dams were constructed prior to the description of this species or the knowledge of its limited distribution.

Recreation has adversely affected Arizona willow habitat and populations. Although part of one recreation site, which was subject to heavy use, has been closed to camping since 1980, compacted soils, relatively poor understory composition, and widespread accelerated streambank losses characterize the area. Arizona willow populations within this disturbed area are the least dense on the Forest (Galeano-Popp 1988). Construction of the Sunrise Ski resort on the Reservation also caused the loss of plants and habitat. Degradation of Arizona willow habitat by off-road vehicle users is a potential recreational threat. Riparian habitats are vulnerable to vehicle damage, which can cause

disrupted streamflow, accelerated sedimentation rates, bank instability, and soil compaction.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

None known.

C. Disease or Predation

Arizona willow on both the Forest and the Reservation is infected by a rust identified as *Melampsora* spp. (Gilbertson, University of Arizona, *in litt.*, 1989). The alternate hosts for the rust are apparently *Abies* spp. (fir) and *Ribes* spp. (gooseberry). Evidence of direct or indirect damage from rust can be seen in dead material of previously large plants. While infection levels vary with locality, one entire half-mile stretch of Arizona willow on the Reservation was defoliated by a rust infection (Galeano-Popp 1988).

Resistance to the rust varies as indicated by the proximity of healthy plants to heavily infected plants. *Melampsora* spp. occur on other willow species in Arizona but do not appear to be virulent pathogens associated with high mortality. However, the impacts of grazing could reduce the vigor of otherwise healthy Arizona willow plants making them more prone to infection. The plants, then weakened by both grazing and disease, are more vulnerable to dying from other environmental factors (e.g. frost) (Galeano-Popp 1988).

Arizona willow is eaten by livestock, elk (*Cervus canadensis*), and perhaps small mammals. While it is difficult to determine the proportional use by livestock, elk, and other wildlife, approximately 85 percent of the carrying capacity of the Forest is allocated to livestock (Galeano-Popp 1988). Initial observations of sites that differ in livestock use indicate that livestock grazing is detrimental to Arizona willow (Galeano-Popp 1988). Lower plant densities and decreased plant height are correlated with areas of high livestock use.

D. The inadequacy of existing regulatory mechanisms

Forest Service policy requires a permit to collect Arizona willow on the Forest (USDA, Forest Service 1986). The Arizona Native Plant Law only requires a permit for collecting highly safeguarded plants (Arizona Revised Statutes chapter 7, title 3, article 1). However, overuse from collecting is not presently considered a threat to Arizona willow and these permit requirements do not protect populations from habitat degradation and loss.

E. Other natural or manmade factors affecting its continued existence

Beaver (*Caster canadensis*) dam construction results in flooding of riparian areas. This flooding can inundate and kill local willow populations and remove suitable habitat (Granfelt, *in litt.*, 1991). This is a localized threat because most Arizona willow habitat appears unsuitable for beaver occupation (Galeano-Popp 1988).

Elk damage other willow species in the area by trampling and by rubbing their antlers and bodies against the plants. No data are available to assess the degree of physical damage by elk to Arizona willow.

Populations may also be limited by other natural factors. Some populations have so few plants remaining (as low as one) they may no longer be viable. In addition, competition with other willow species, or conversely, loss of cover provided by other riparian plants may contribute to the decline of the species.

The Service has carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by this species in determining to propose this rule. Based on this evaluation, the preferred action is to list *Salix arizonica* as endangered. A combination of factors contribute to the decision to propose this species as endangered. Arizona willow plants tend to be sparsely distributed within a small range. Within this small area, threats are numerous, complex, and not easily identified or resolved. Some threats, such as the rust, may not be resolvable. The small range, sparse distribution, degraded habitat, threats due to natural causes and the difficulty of conflict resolution have contributed to the decision to propose this species as endangered rather than threatened. Threatened status would not accurately reflect the precarious status of this species. Critical habitat is being proposed for the reasons stated below.

Critical Habitat

Critical habitat, as defined by section 3(5)(A) of the Act means:

(i) the specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) that may require special management considerations or protection and;

(ii) specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are

essential for the conservation of the species.

Section 4(a)(3) of the Act requires that critical habitat be designated to the maximum extent prudent and determinable concurrently with the determination that a species is endangered or threatened. Critical habitat is being proposed for *Salix arizonica* to include high altitude riparian areas along streams or cienegas on the northern, eastern, and southern slopes of the White Mountains hill mass, Apache County, east-central Arizona. The following areas are proposed as critical habitat:

(1) Approximately 5.6 km (3.5 miles) of Becker Creek and associated tributaries.

(2) Approximately 1.6 km (1 mile) of an unnamed tributary entering Snake Creek from the east in the SE¼ Section 14, T7N R28E.

(3) Approximately 1.8 km (1.1 miles) of Snake Creek.

(4) Approximately 2.9 km (1.8 miles) of Ord Creek, including the reach flowing through Smith Cienega.

(5) Hall Creek upstream approximately 5.3 km (3.3 miles) from the high water mark of the White Mountain Reservoir.

(6) Approximately 7.3 km (4.5 miles) of the West Fork of the Little Colorado River and associated tributaries.

(7) Approximately 13.9 km (8.6 miles) of the East Fork of Little Colorado River and tributaries, including the South Fork of the East Fork of the Little Colorado River.

(8) Purcell Cienega, 65 hectares (160 acres).

(9) Approximately 4.2 km (2.6 miles) of Thompson Creek, including Hall Cienega.

(10) Approximately 4.5 km (2.9 miles) of the West Fork of the Black River between Stinky Creek and Thompson Creek.

(11) Approximately 5.0 km (3.1 miles) of Stinky Creek, between the West Fork of the Black River and the Apache-Sitgreaves National Forest boundary.

(12) Reservation Creek upstream approximately 0.8 km (0.4 mile) from Reservation Lake.

(13) Reservation Creek downstream approximately 3.5 km (2.2 miles) from Reservation Lake, including Deep Cienega.

(14) Approximately 4.2 km (2.6 miles) of Pacheta Creek, including Upper Pacheta Cienega.

(15) Hurricane Creek approximately 2.3 km (1.4 miles) upstream from the normal high water mark of Hurricane Lake.

(16) Approximately 1.0 km (0.6 mile) of an unnamed tributary of Reservation Creek.

Sites numbered 1 through 4, 8, and 12 through 16 are on the White Mountain Fort Apache Indian Reservation. Sites numbered 6, 7, and 11 are on the Apache-Sitgreaves National Forest. Sites numbered 5 and 10 are on the Apache-Sitgreaves National Forest and private land. Site number 9 is on the White Mountain Fort Apache Indian Reservation, Apache-Sitgreaves National Forest and private land. The legal descriptions of specific locations of critical habitat areas are given below under the Proposed Regulations Promulgation section of this proposed rule.

A total of approximately 68 km (40 miles) of stream and 65 hectares (160 acres) of critical habitat is proposed. The areas described were chosen for critical habitat designation because they contain Arizona willow plants. All reaches also contain some unoccupied habitat needed to maintain ecosystem integrity or to support larger Arizona willow populations as the species expands during recovery. A number of separate, protected, healthy populations of Arizona willow are needed to protect the species from extinction if floods cause the loss of one or several populations. Protection of this proposed critical habitat will ensure that sufficient quantity and quality of habitat exists to prevent this species from becoming extinct throughout all or a significant portion of its range.

Constituent elements for all areas of critical habitat except Purcell Cienega include areas that contain the amount and timing of perennial, clear, clean, unpolluted surface and subsurface water flow sufficient to promote vigorous growth and reproduction of Arizona willow. The constituent elements include the riparian ecosystem within 200 years of the center of the stream drainage bottom (measured perpendicularly to the channel) except where (a) tree canopy cover exceeds 25 percent or (b) greater than 25 percent cover is contributed by Arizona fescue (*Festuca arizonica*) and Mountain muhly (*Muhlenbergia montana*). Constituent elements for Purcell Cienega include all areas within the boundaries of the quarter-sections described above that contain the amount and timing of perennial, clear, clean, unpolluted surface and subsurface water flow sufficient to promote vigorous growth and reproduction of Arizona willow and the riparian ecosystem except where the following habitat conditions are met: (a) Tree canopy cover exceeds 25 percent or (b) greater than 25 percent cover is contributed by Arizona fescue (*Festuca arizonica*) and Mountain muhly (*Muhlenbergia montana*).

Section 4(b)(8) requires, for any proposed or final regulation that designates critical habitat, a brief description and evaluation of those activities (public or private) that may adversely modify such habitat or may be affected by such designation. Such activities may include road maintenance or construction, timber harvesting, water diversion or impoundment, groundwater pumping, any other activity that may alter the quality or quantity of surface or subsurface water flow, development of recreational facilities near occupied or recovery habitat, and overstocking or other mismanagement of livestock or elk.

Section 4(b)(2) of the Act requires the Service to consider economic and other impacts of designating a particular area as critical habitat. The Service will consider the critical habitat designation in light of all additional relevant information obtained before making a decision on whether to issue a final rule.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Endangered Species Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing encourages and results in conservation actions by Federal, State, and private agencies, groups, and individuals. The Endangered Species Act provides for possible land acquisition and cooperation with the States. The protection required of Federal agencies and the prohibitions against certain activities involving listed plants are discussed, in part, below.

Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any is being designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(4) requires Federal agencies to confer informally with the Service on any action that is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed critical habitat. If a species is listed subsequently, section 7(a)(2) requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of such a species or to destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical

habitat, the responsible Federal agency must enter into formal consultation with the Service.

The Act and its implementing regulations found at 50 CFR 17.61, 17.62, and 17.63 for endangered species set forth a series of general prohibitions and exceptions that apply to all endangered plants. All trade prohibitions of section 9(a)(2) of the Act, implemented by 50 CFR 17.61, apply. These prohibitions, in part, make it illegal for any person subject to the jurisdiction of the United States to import or export, transport in interstate or foreign commerce in the course of a commercial activity, sell or offer for sale this species in interstate or foreign commerce, or to remove and reduce to possession the species from areas under Federal jurisdiction. In addition, for listed plants, the 1988 amendments (Pub. L. 100-478) to the Act prohibit the malicious damage or destruction on Federal lands and the removal, cutting, digging up, or damaging or destroying endangered plants in knowing violation of any State law or regulation, including State criminal trespass law. Certain exceptions apply to agents of the Service and State conservation agencies. The Act and 50 CFR 17.62 and 17.63 also provide for the issuance of permits to carry out otherwise prohibited activities involving endangered species under certain circumstances.

It is anticipated that few trade permits would ever be sought or issued because the species is not common in cultivation or in the wild. Requests for copies of the regulations on plants and inquiries regarding them may be addressed to the Office of Management Authority, U.S. Fish and Wildlife Service, P.O. Box 3507, Arlington, Virginia 22201 (703/358-2104).

Public Comments Solicited

The Service intends that any final action resulting from this proposal will be as accurate and as effective as possible. Therefore, comments or suggestions from the public, other concerned governmental agencies, the scientific community, industry, or any other interested party concerning this proposed rule are hereby solicited.

Comments are particularly sought concerning:

- (1) Biological, commercial trade, or other relevant data concerning any threat (or lack thereof) to this species;
- (2) The location of any additional populations of this species and the reasons why any habitat should or should not be determined to be critical habitat as provided by section 4 of the Act;
- (3) Additional information concerning the range, distribution, and population size of this species; and
- (4) Current or planned activities in the subject area and their possible impacts on this species.
- (5) Any foreseeable economic and other impacts resulting from the proposed designation of critical habitat.

Final promulgation of the regulations on this species will take into consideration the comments and any additional information received by the Service, and such communications may lead to a final regulation that differs from this proposal.

The Endangered Species Act provides for a public hearing on this proposal, if requested. Requests must be received within 45 days of the date of publication of the proposal. Such requests must be made in writing and addressed to Sam F. Spiller, Field Supervisor, U.S. Fish and Wildlife Service, Ecological Services Field Office (refer to ADDRESSES section).

National Environmental Policy Act

The Fish and Wildlife Service has determined that an Environmental Assessment, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act of 1973, as amended. A notice outlining the Service's reasons for this determination was published in the Federal Register on October 25, 1983 (48 FR 49244).

References Cited

- Dorn, R.D. 1975. A systematic study of *Salix* section *Cordatae* in North America. Canadian Journal of Botany. 53:1491-1522.

Galeano-Popp, R.C. 1988. *Salix arizonica* Dorn. on the Apache-Sitgreaves National Forest: inventory and habitat study. Apache-Sitgreaves National Forest, Springerville, Arizona. 47 pp.

Granfelt, C. 1989. Arizona willow (*Salix arizonica* Dorn) populations on the Fort Apache Indian Reservation, Arizona. White Mountain Apache Game and Fish Department, White River, Arizona. 37 pp.

Medina, A.L. 1990. Study plan: Autecology of Arizona willow in the Mount Baldy region of east central Arizona. U.S. Forest Service, Rocky Mountain Forest and Range Experiment Station, Tempe, Arizona. 28 pp.

Phillips, B.G., N. Brian, J. Mazzone, and L.T. Green III. 1982. Status report for *Salix arizonica*. Fish and Wildlife Service, Albuquerque, New Mexico. 12 pp.

USDA. Forest Service. 1986. Forest Service Manual, title 2800—wildlife, fish, and sensitive plant habitat management.

Authors

The primary authors of this proposed rule are William Austin and Sue Rutman (see ADDRESSES).

List of Subjects in 50 CFR Part 17

Endangered and threatened species. Exports, Imports, Reporting and recordkeeping requirements. Transportation.

Proposed Regulations Promulgation

PART 17—[AMENDED]

Accordingly, it is hereby proposed to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

1. The authority citation for Part 17 continues to read as follows:

Authority: 16 U.S.C. 1361-1407; 16 U.S.C. 1531-1544; 16 U.S.C. 4201-4245; Pub. L. 99-625, 100 Stat. 3500; unless otherwise noted.

2. It is proposed to amend § 17.12(h) for plants by adding the following species and by adding a new family "Salicaceae—Willow family," in alphabetical order, to the List of Endangered and Threatened Plants:

§ 17.12 Endangered and threatened plants.

• • • • •
(h) • • •

Species		Historic range	Status	When listed	Critical habitat	Special rules
Scientific name	Common name					
Salicaceae—Willow family:						
<i>Salix arizonica</i>	arizona willow	U.S.C. (AZ)	E		17.96(a)	NA

3. It is further proposed to amend § 17.96(a) by adding critical habitat of *Salix arizonica* (Arizona willow) in the same alphabetical order as the species occurs in § 17.12(h).

§ 17.96 Critical habitat—plants.

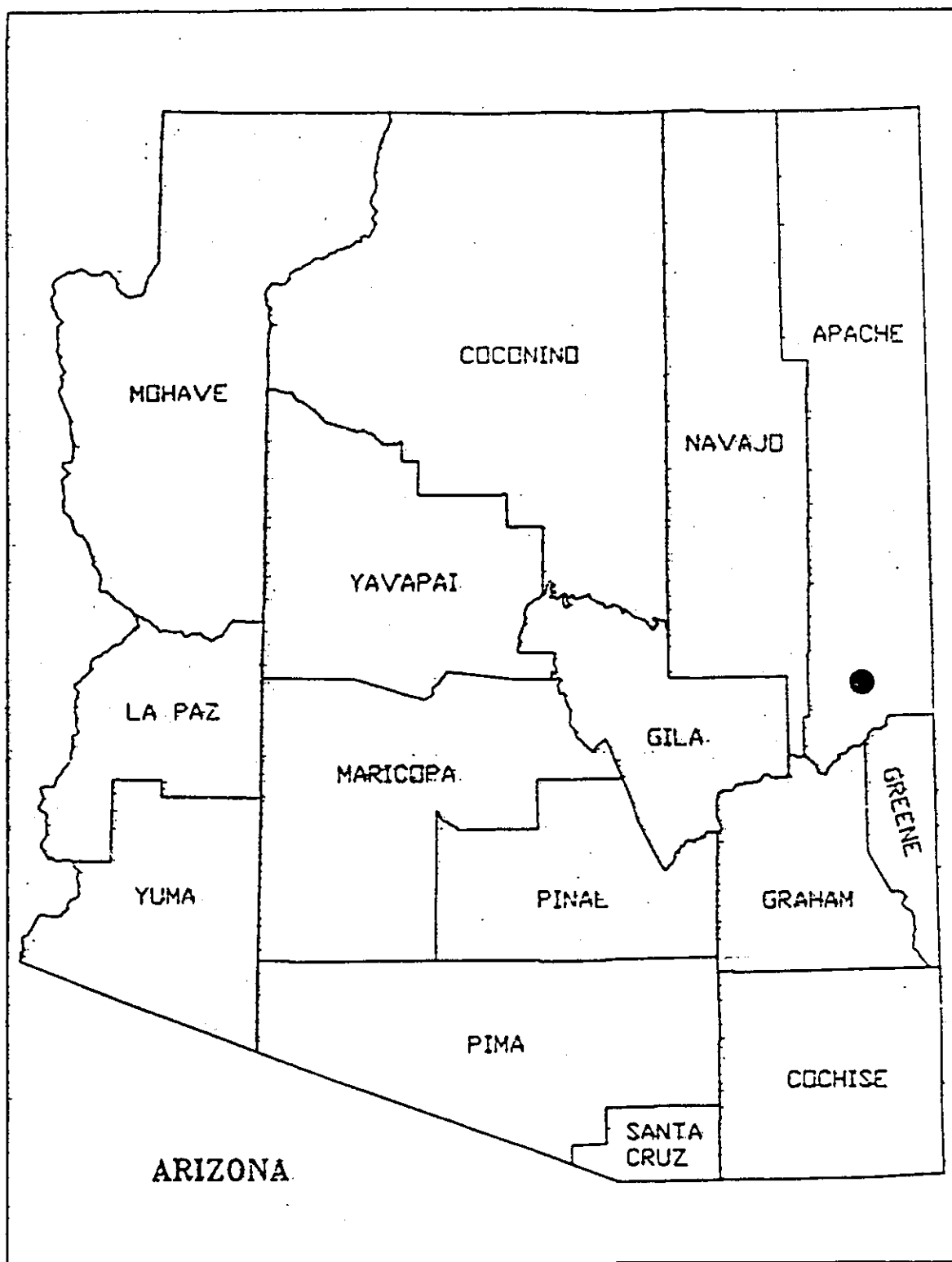
(a) * * *

Family—Salicaceae.

Salix arizonica (Arizona willow).

Arizona: Maps 2-7 are subset maps located in the general area indicated on map 1

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1. *Apache County*: Becker Creek upstream from its confluence with Snake Creek to the western boundary of the E $\frac{1}{2}$ NE $\frac{1}{4}$ Section 28, T7N R26E, including unnamed tributaries in the following sections of T7N R26E: the NE $\frac{1}{4}$ NE $\frac{1}{4}$ Section 22, the E $\frac{1}{2}$ NE $\frac{1}{4}$ Section 26, and the W $\frac{1}{2}$ NW $\frac{1}{4}$ Section 25. The boundaries include areas with the amount and timing of perennial, clear, clean, unpolluted surface and subsurface flow sufficient to promote vigorous growth and reproduction of Arizona willow and the riparian ecosystem within 200 yards on either side of the center of the drainage bottom (measured perpendicularly to the channel), except where the following habitat conditions are met: (a) Tree canopy cover exceeds 25 percent or (b) greater than 25 percent cover is contributed by Arizona fescue (*Festuca arizonica*) and Mountain muhly (*Muhlenbergia montana*).

2. *Apache County*: An unnamed tributary entering Snake Creek from the east of SE $\frac{1}{4}$ Section 14 in T7N R26E, upstream to the southern boundary of the NW $\frac{1}{4}$ SW $\frac{1}{4}$ Section 13, T7N R26E. The boundaries include areas with the

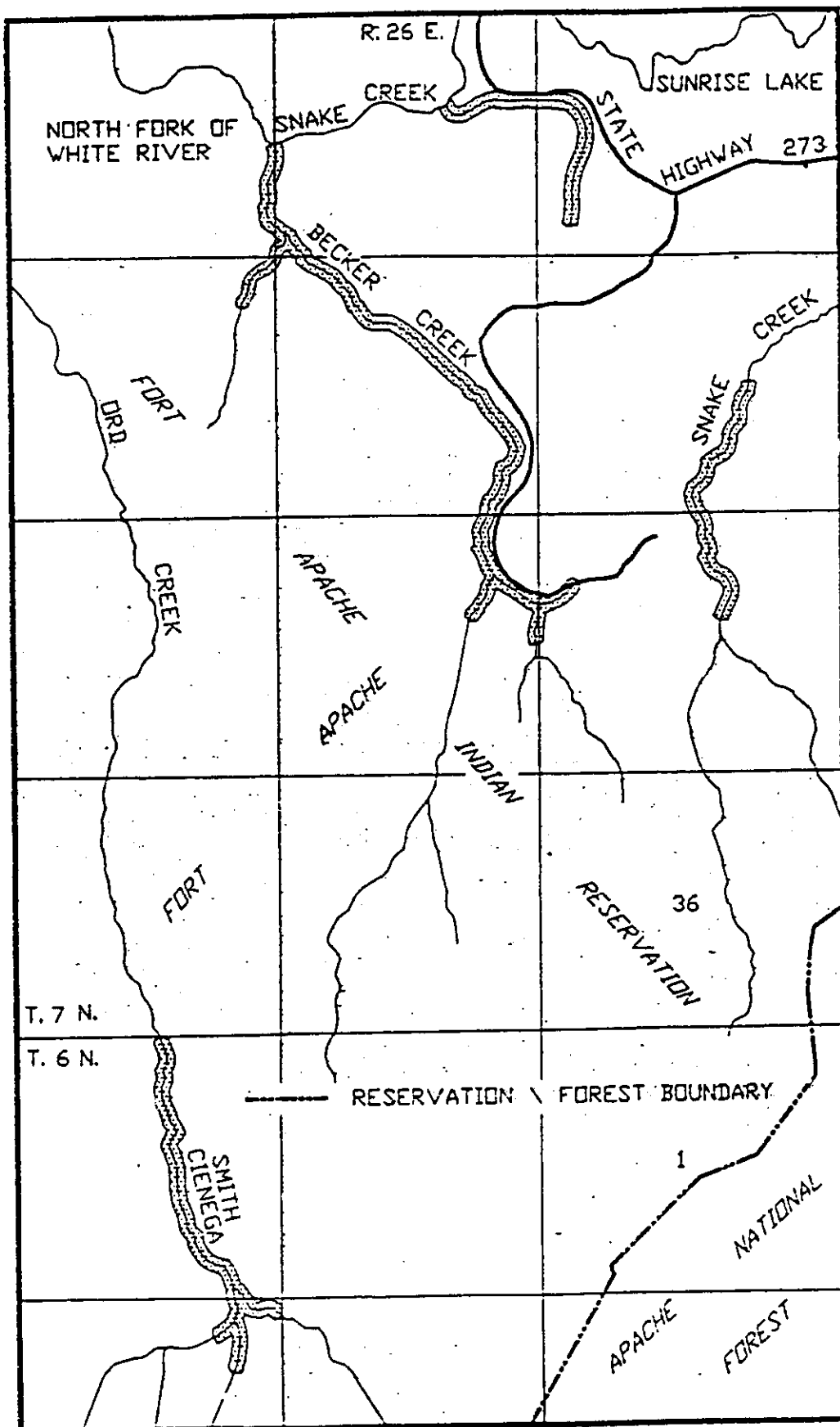
amount and timing of perennial, clear, clean, unpolluted surface and subsurface flow sufficient to promote vigorous growth and reproduction of Arizona willow and the riparian ecosystem within 200 yards on either side of the center of the drainage bottom (measured perpendicularly to the channel), except where the following habitat conditions are met: (a) Tree canopy cover exceeds 25 percent or (b) greater than 25 percent cover is contributed by Arizona fescue (*Festuca arizonica*) and Mountain muhly (*Muhlenbergia montana*).

3. *Apache County*: Snake Creek from the northern boundary of the S $\frac{1}{2}$ Section 24, T7N R26E, upstream to the southern boundary of the N $\frac{1}{2}$ Section 25, T7N R26E. The boundaries include areas with the amount and timing of perennial, clear, clean, unpolluted surface and subsurface flow sufficient to promote vigorous growth and reproduction of Arizona willow and the riparian ecosystem within 200 yards on either side of the center of the drainage bottom (measured perpendicularly to the channel), except where the following habitat conditions are met: (a) Tree

canopy cover exceeds 25 percent or (b) greater than 25 percent cover is contributed by Arizona fescue (*Festuca arizonica*) and Mountain muhly (*Muhlenbergia montana*).

4. *Apache County*: Ord Creek including the section of the stream flowing through Section 3, T6N R26E (including the reach flowing through Smith Cienega), and including Ord Creek and unnamed tributaries in the NE $\frac{1}{4}$ NE $\frac{1}{4}$ Section 10, T6N R26E. The boundaries include areas with the amount and timing of perennial, clear, clean, unpolluted surface and subsurface flow sufficient to promote vigorous growth and reproduction of Arizona willow and the riparian ecosystem within 200 yards on either side of the center of the drainage bottom (measured perpendicularly to the channel), except where the following habitat conditions are met: (a) Tree canopy cover exceeds 25 percent or (b) greater than 25 percent cover is contributed by Arizona fescue (*Festuca arizonica*) and Mountain muhly (*Muhlenbergia montana*).

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5. *Apache County*: Hall Creek upstream from the high water mark of the White Mountain Reservoir, to the southern boundary of the N½ Section 31, T7N R27E. The boundaries include areas with the amount and timing of perennial, clear, clean, unpolluted surface and subsurface flow sufficient to promote vigorous growth and reproduction of Arizona willow and the riparian ecosystem within 200 yards on either side of the center of the drainage bottom (measured perpendicularly to the channel), except where the following

habitat conditions are met: (a) Tree canopy cover exceeds 25 percent or (b) greater than 25 percent cover is contributed by Arizona fescue (*Festuca arizonica*) and Mountain muhly (*Muhlenbergia montana*).

6. *Apache County*: West Fork of Little Colorado River and tributaries in T7N R27E, Sections 32 and 33; T6N R27E, Sections 5, 6, and 7; and T6N R26E, Section 12. The boundaries include areas with the amount and timing of perennial, clear, clean, unpolluted surface and subsurface flow sufficient to

promote vigorous growth and reproduction of Arizona willow and the riparian ecosystem within 200 yards on either side of the center of the drainage bottom (measured perpendicularly to the channel), except where the following habitat conditions are met: (a) Tree canopy cover exceeds 25 percent or (b) greater than 25 percent cover is contributed by Arizona fescue (*Festuca arizonica*) and Mountain muhly (*Muhlenbergia montana*).

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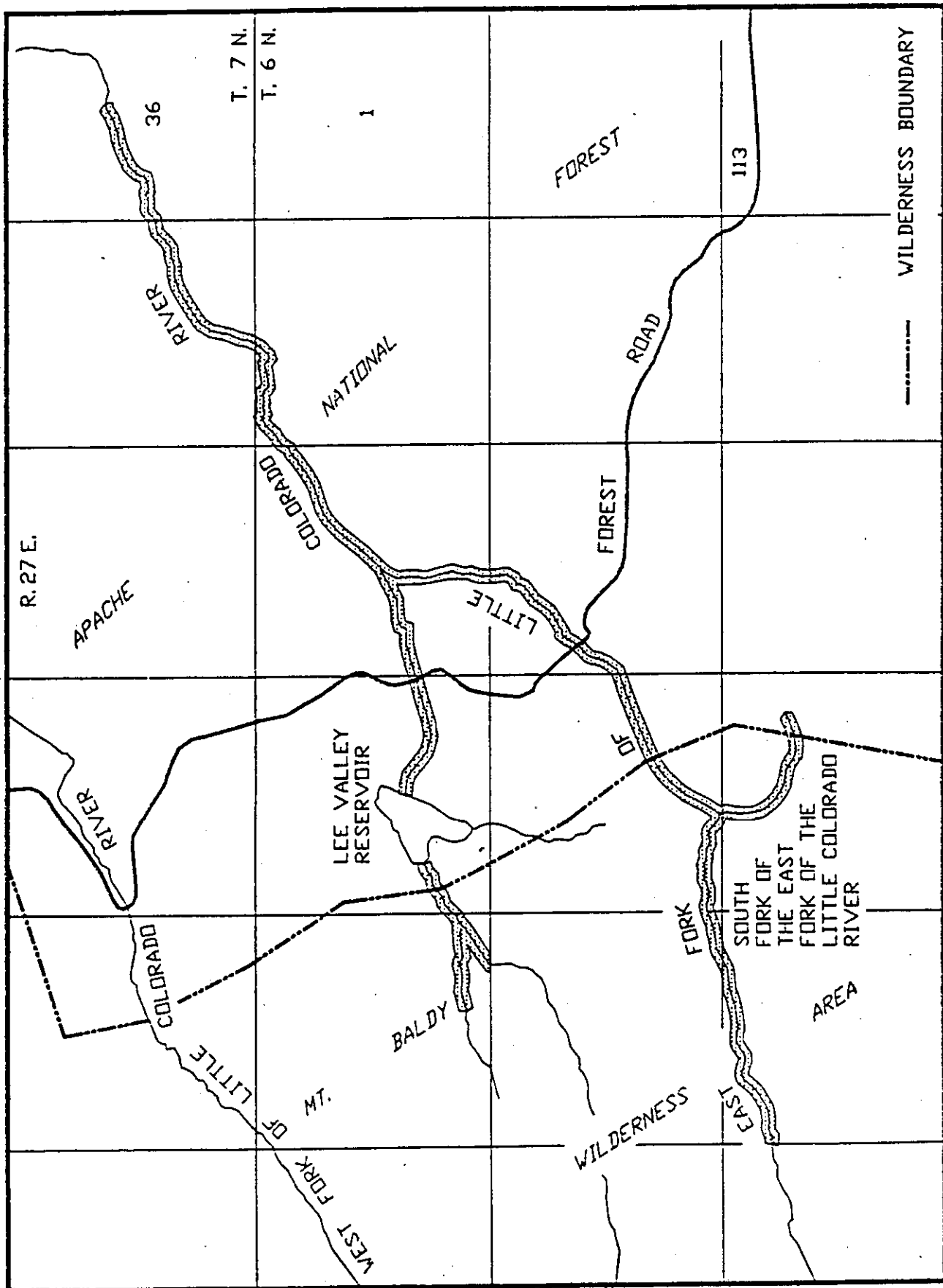


7. *Apache County:* East Fork of Little Colorado River upstream from the eastern boundary of the W½ Section 36, T7N R27E, to the western boundary of T6N R27E, Section 17. Tributaries included in this stream complex include downstream from Lee Valley Reservoir to the East Fork of the Little Colorado River (T6N R27E, Sections 3 and 4), the South Fork of the East Fork of the Little Colorado River (T6N R27E, Sections 9 and 16), the tributary between Coulter

Reservoir and Lee Valley Reservoir (T6N R27E, Section 12), the tributary that forms the northwest arm of Lee Valley Reservoir from the high water mark of the reservoir upstream to include two forks within Section 3, T6N R27E. The boundaries include areas with the amount and timing of perennial, clear, clean, unpolluted surface and subsurface flow sufficient to promote vigorous growth and reproduction of Arizona willow and the riparian

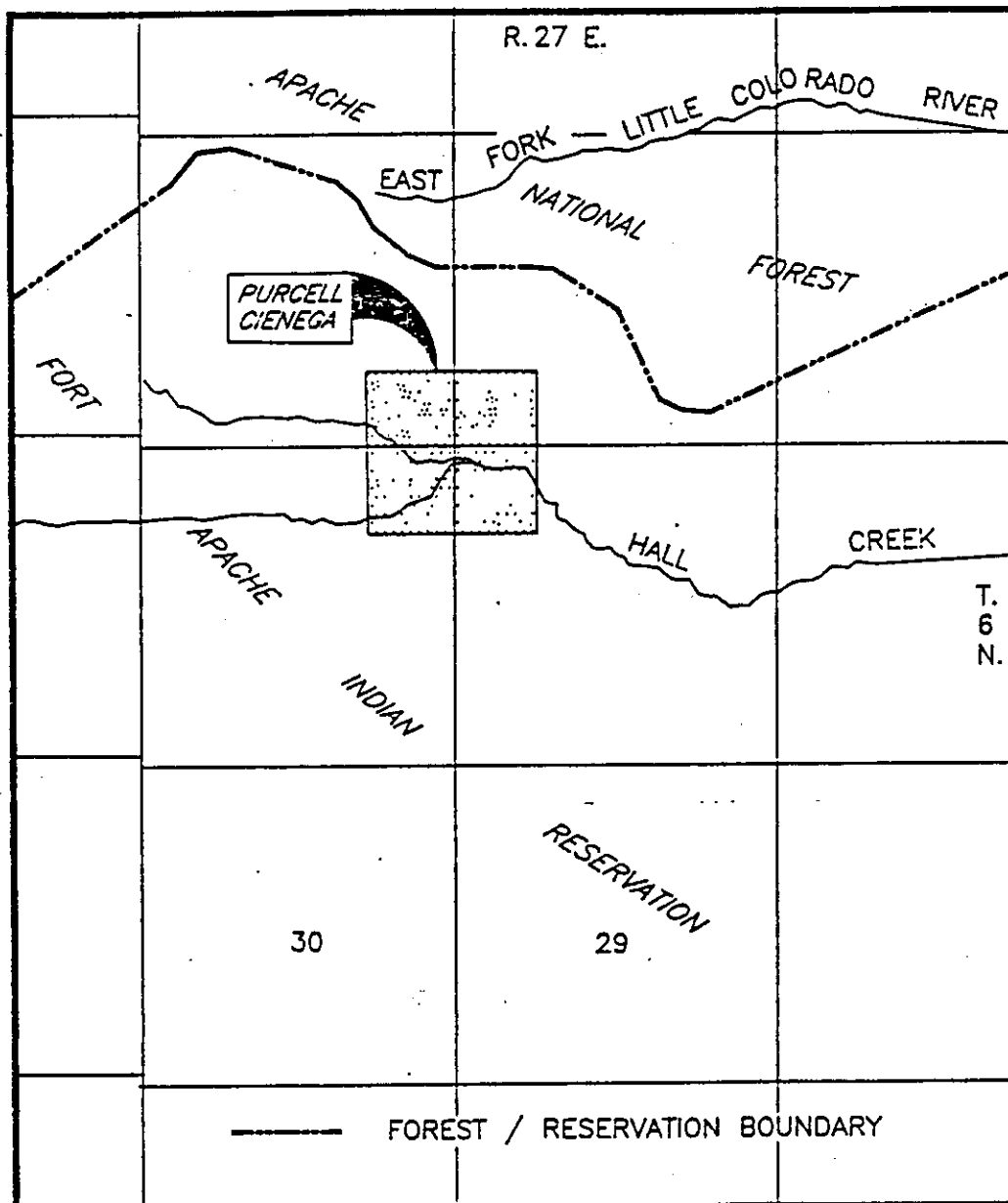
ecosystem within 200 yards on either side of the center of the drainage bottom (measured perpendicularly to the channel), except where the following habitat conditions are met: (a) Tree canopy cover exceeds 25 percent or (b) greater than 25 percent cover is contributed by Arizona fescue (*Festuca arizonica*) and Mountain muhly (*Muhlenbergia montana*).

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8. *Apache County*: Purcell Cienega, which occurs along a reach of the West Fork of the Black River in T6N R27E in the following Sections: NE¼NE¼ Section 19, SE¼SE¼ Section 18, SW¼SW¼ Section 17, and NW¼NW¼ Section 20. The boundaries include those areas of the quarter-sections described above that contain the amount and timing of perennial, clear, clean, unpolluted surface and subsurface flow sufficient to promote vigorous growth and reproduction of Arizona willow and the riparian ecosystem except where the following habitat conditions are met: (a) Tree canopy cover exceeds 25 percent or (b) greater than 25 percent cover is contributed by Arizona fescue (*Festuca arizonica*) and Mountain muhly (*Muhlenbergia montana*).

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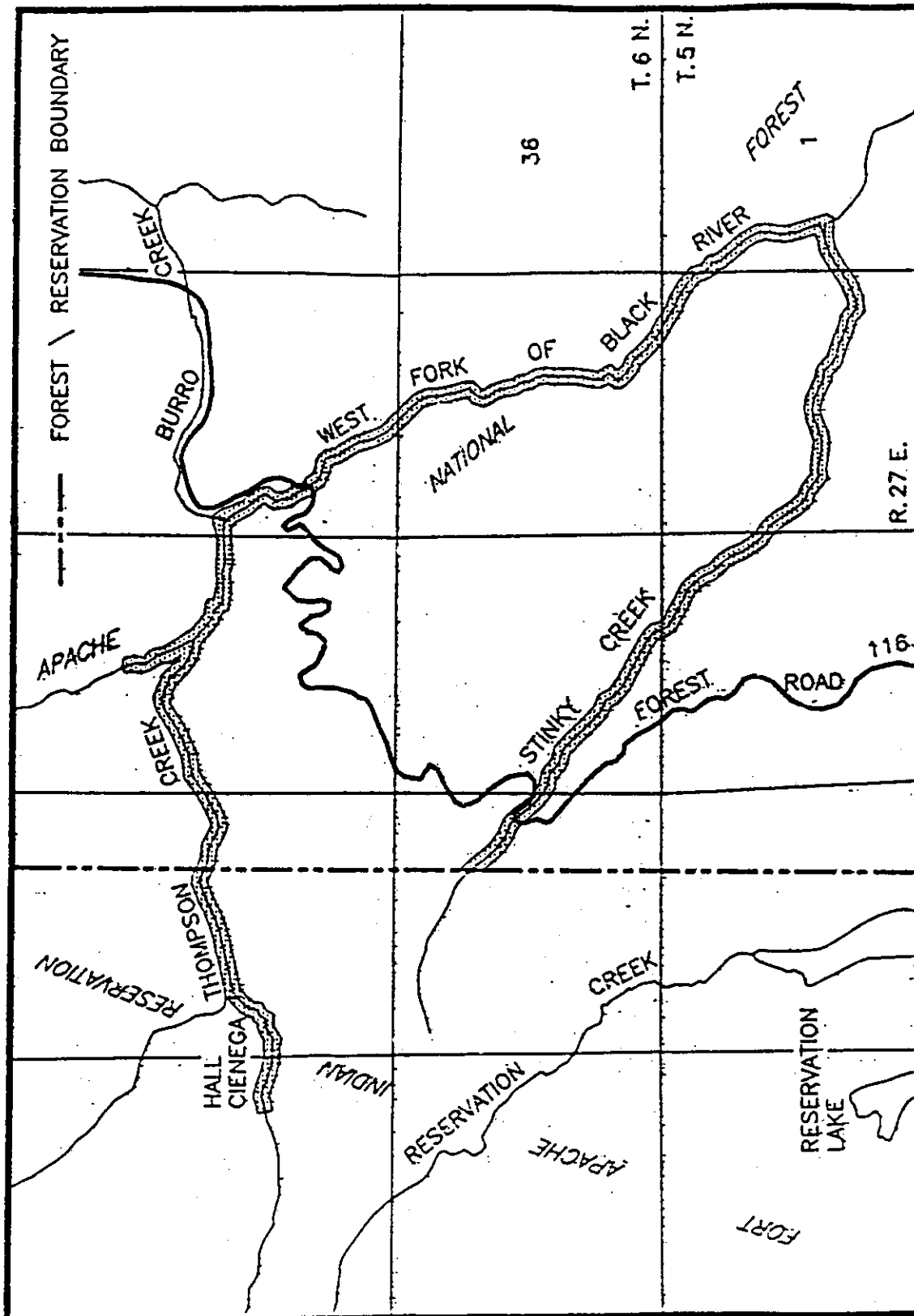


9. *Apache County*: Thompson Creek from the confluence of Thompson Creek and the West Fork of the Black River (T6N R27E, Section 27) upstream to the western boundary of the E 1/4 T6N R27E, Section 29. The boundaries include areas with the amount and timing of perennial, clear, clean, unpolluted surface and subsurface flow sufficient to promote vigorous growth and reproduction of Arizona willow and the riparian ecosystem within 200 yards on either side of the center of the drainage bottom (measured perpendicularly to the channel), except where the following habitat conditions are met: (a) tree canopy cover exceeds 25 percent or (b) greater than 25 percent cover is contributed by Arizona fescue (*Festuca arizonica*) and Mountain muhly (*Muhlenbergia montana*).

10. *Apache County*: West Fork of the Black River, upstream from its confluence with Stinky Creek (T5N R27E, Section 1) to the confluence of Thompson Creek and the West Fork (T6N R27E, Section 27). The boundaries include areas with the amount and timing of perennial, clear, clean, unpolluted surface and subsurface flow sufficient to promote vigorous growth and reproduction of Arizona willow and the riparian ecosystem within 200 yards on either side of the center of the drainage bottom (measured perpendicularly to the channel), except where the following habitat conditions are met: (a) Tree canopy cover exceeds 25 percent or (b) greater than 25 percent cover is contributed by Arizona fescue (*Festuca arizonica*) and Mountain muhly (*Muhlenbergia montana*).

11. *Apache County*: Stinky Creek from its confluence with the West Fork of the Black River (T5N R27E, Section 1) upstream to the boundary of the Apache-Sitgreaves National Forest (T6N R27E, Section 33). The boundaries include areas with the amount and timing of perennial, clear, clean, unpolluted surface and subsurface flow sufficient to promote vigorous growth and reproduction of Arizona willow and the riparian ecosystem within 200 yards on either side of the center of the drainage bottom (measured perpendicularly to the channel), except where the following habitat conditions are met: (a) Tree canopy cover exceeds 25 percent or (b) greater than 25 percent cover is contributed by Arizona fescue (*Festuca arizonica*) and Mountain muhly (*Muhlenbergia montana*).

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12. *Apache County*: Reservation Creek from the normal high water mark of Reservation Lake upstream to the northern boundary of the NE¼ Section 4, T5N R27E. The boundaries include areas with the amount and timing of perennial, clear, clean, unpolluted surface and subsurface flow sufficient to promote vigorous growth and reproduction of Arizona willow and the riparian ecosystem within 200 yards on either side of the center of the drainage bottom (measured perpendicularly to the channel), except where the following habitat conditions are met: (a) Tree canopy cover exceeds 25 percent or (b) greater than 25 percent cover is contributed by Arizona fescue (*Festuca arizonica*) and Mountain muhly (*Muhlenbergia montana*).

13. *Apache County*: Reservation Creek downstream from the outlet from Reservation Lake (T5N R27E, Section 7) to the southern boundary of T5N R27E, Section 20. The boundaries include areas with the amount and timing of perennial, clear, clean, unpolluted surface and subsurface flow sufficient to promote vigorous growth and reproduction of Arizona willow and the riparian ecosystem within 200 yards on either side of the center of the drainage bottom (measured perpendicularly to the channel), except where the following

habitat conditions are met: (a) Tree canopy cover exceeds 25 percent or (b) greater than 25 percent cover is contributed by Arizona fescue (*Festuca arizonica*) and Mountain muhly (*Muhlenbergia montana*).

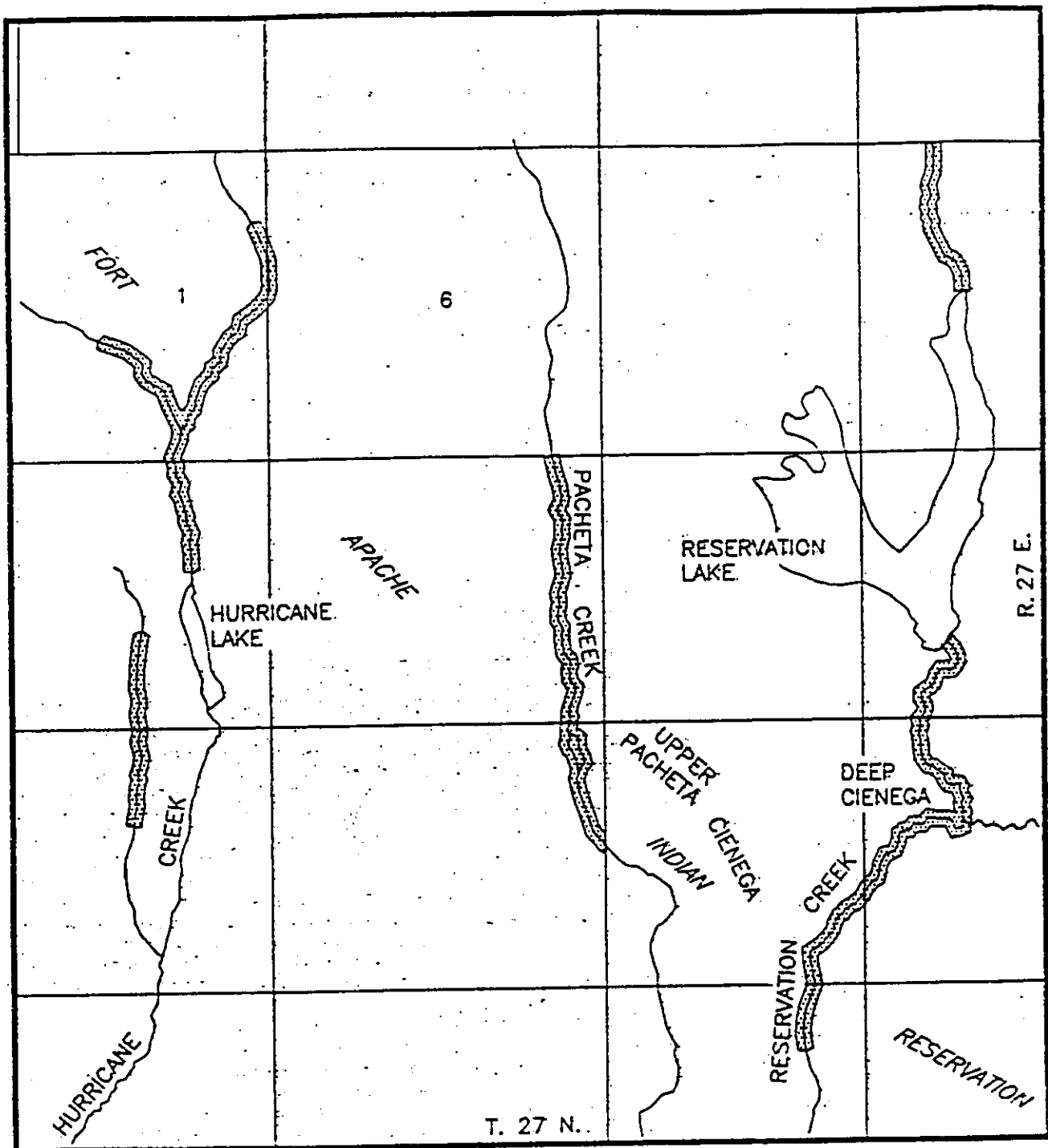
14. *Apache County*: Pacheta Creek in T5N R27E, Sections 7 and 8. The boundaries include areas with the amount and timing of perennial, clear, clean, unpolluted surface and subsurface flow sufficient to promote vigorous growth and reproduction of Arizona willow and the riparian ecosystem within 200 yards on either side of the center of the drainage bottom (measured perpendicularly to the channel), except where the following habitat conditions are met: (a) Tree canopy cover exceeds 25 percent or (b) greater than 25 percent cover is contributed by Arizona fescue (*Festuca arizonica*) and Mountain muhly (*Muhlenbergia montana*).

15. *Apache County*: Hurricane Creek upstream from the normal high water mark of Hurricane Lake to the northern boundary of the S¼ Section 1, T5N R26E, including the unnamed tributary in that subsection. The boundaries include areas with the amount and timing of perennial, clear, clean, unpolluted surface and subsurface flow sufficient to promote vigorous growth

and reproduction of Arizona willow and the riparian ecosystem within 200 yards on either side of the center of the drainage bottom (measured perpendicularly to the channel), except where the following habitat conditions are met: (a) Tree canopy cover exceeds 25 percent or (b) greater than 25 percent cover is contributed by Arizona fescue (*Festuca arizonica*) and Mountain muhly (*Muhlenbergia montana*).

16. *Apache County*: A reach of an unnamed tributary of Reservation Creek, including the NE¼NW¼ Section 13, T5N R26E, upstream through the SE¼SW¼ Section 12, T5N R26E. The boundaries include areas with the amount and timing of perennial, clear, clean, unpolluted surface and subsurface flow sufficient to promote vigorous growth and reproduction of Arizona willow and the riparian ecosystem within 200 yards on either side of the center of the drainage bottom (measured perpendicularly to the channel), except where the following habitat conditions are met: (a) Tree canopy cover exceeds 25 percent or (b) greater than 25 percent cover is contributed by Arizona fescue (*Festuca arizonica*) and Mountain muhly (*Muhlenbergia montana*).

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Constituent elements for all areas of critical habitat except Purcell Cienega include areas with the amount and timing of perennial, clear, clean, unpolluted surface and subsurface flow sufficient to promote vigorous growth and reproduction of Arizona willow and the riparian ecosystem within 200 yards of the center of the drainage bottom (measured perpendicularly to the channel) to incorporate the broader areas with plants, except where the following habitat conditions are met: (a)

Tree canopy cover exceeds 25 percent or (b) greater than 25 percent cover is contributed by Arizona fescue (*Festuca arizonica*) and Mountain muhly (*Muhlenbergia montana*). Constituent elements for Purcell Cienega include all areas within the boundaries of the quarter-sections described above that contain the amount and timing of perennial, clear, clean, unpolluted surface and subsurface flow sufficient to promote vigorous growth and reproduction of Arizona willow and the

riparian ecosystem except where the following habitat conditions are met: (a) Tree canopy cover exceeds 25 percent or (b) greater than 25 percent cover is contributed by Arizona fescue (*Festuca arizonica*) and Mountain muhly (*Muhlenbergia montana*).

Dated: October 14, 1992.

Richard N. Smith,

Acting Director, Fish and Wildlife Service.

[FR Doc. 92-28066 Filed 11-19-92; 8:45 am]

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**ARIZONA WILLOW
CONSERVATION AGREEMENT AND STRATEGY**

APPENDIX F

**RARE AND SENSITIVE SPECIES
WITHIN ARIZONA WILLOW ECOSYSTEMS**

RARE AND SENSITIVE SPECIES OCCURRING WITHIN ARIZONA WILLOW ECOSYSTEMS

Common Name Scientific Name	Status	White Mountains Arizona	Dixie NF Utah	Fishlake NF Utah
Mammals				
Fringed myotis (<i>Myotis thysanodes</i>)	C2	X		
Spotted bat (<i>Euderma maculatum</i>)	C2	X	X	X
Long-legged myotis (<i>Myotis volans</i>)	C2	X		
Long-eared myotis (<i>Myotis evotis</i>)	C2	X		
Townsend's big-eared bat (<i>Plecotus townsendii</i>)	C2		X	X
New Mexican jumping mouse (<i>Zapus hudsonius luteus</i>)	C2	X		
Water Shrew (<i>Sorex palustris</i>)		X		
Birds				
?American peregrine falcon (<i>Falco peregrinus anatum</i>)	E	X	X	X
Bald eagle (<i>Haliaeetus leucocephalus</i>)	E	X		
Mexican spotted owl (<i>Strix occidentalis lucida</i>)	T	X		
Southwestern willow flycatcher (<i>Empidonax traillii extimus</i>)	E	X	?	X
Northern goshawk (<i>Accipiter gentilis</i>)	C2	X	X	X
Fish				
Apache trout (<i>Oncorhynchus apache</i>)	T	X		
Speckled dace (<i>Rhinichthys osculus</i>)	C2	X		
Amphibians				
Boreal toad (<i>Bufo boreas</i>)	C2		X	

Common Name Scientific Name	Status	White Mountains Arizona	Dixie NF Utah	Fishlake NF Utah
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Invertebrates

False ameleus mayfly (<i>Ameletus falsus</i>)	C2	X		
White Mountains water penny beetle (<i>Psephenus montanus</i>)	C2	X		
Three Forks springsnail (<i>Fonticella trivialis</i>)	C2	X		
California floater (<i>Anodonta californiensis</i>)	C2	X		

Plants

Gila groundsel (<i>Senecio quaerens</i>)	C2	X		
White Mountains clover (<i>Trifolium longipes</i> var. <i>neurophyllum</i>)	C2	X		
White Mountains paintbrush (<i>Castilleja mogollonica</i>)	C2	X		
Goodding's onion (<i>Allium gooddingii</i>)	C1	X		
Standley Whitlow grass (<i>Draba standleyi</i>)	C2	X		
<i>Gentianella wislizenii</i>	C2	X		
<i>Botrychium paradoxum</i>	C2		X	?
<i>Penstemon leiophyllus</i>			X	

**ARIZONA WILLOW
CONSERVATION AGREEMENT AND STRATEGY**

APPENDIX G

**WITHDRAWAL OF ARIZONA WILLOW PROPOSED RULE
(60 FR 20951)**

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN 1018-AB83

Endangered and Threatened Wildlife and Plants: Withdrawal of Proposed Rule to List the Plant *Salix arizonica* (Arizona Willow) as Endangered With Critical Habitat

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule; withdrawal.

SUMMARY: The Fish and Wildlife Service (Service) withdraws a proposal to list the plant *Salix arizonica* (Arizona willow) as an endangered species with critical habitat under the Endangered Species Act of 1973, as amended (Act). The Service finds that evidence now available, discussed below, does not justify listing of the species as proposed. Additional field surveys have provided new data indicating that the species has a wider distribution and greater abundance than previously known. A multi-agency "Arizona Willow Conservation Agreement and Strategy" (AWCAS) signed April 7, 1995, has been developed that commits several Federal and State agencies to specific actions to immediately reduce site-specific threats, to provide long-term protection and habitat improvement, and to carry out proactive conservation actions. The White Mountain Apache Tribe (Tribe) has developed the "Arizona Willow Management Plan: An Interim Approach to High-Elevation Riparian and Cienega Ecosystem Management on the Fort Apache Indian Reservation" which is consistent with, and complementary to, the strategies and intent set forth in the AWCAS. Although Arizona willow is still considered rare and potentially vulnerable, the new distribution data in combination with the management commitments in the AWCAS and the tribal plan, reduce the relative magnitude and severity of threats to the species so that listing is no longer considered warranted.

ADDRESSES: The complete file for this notice is available for public inspection by appointment, during normal business hours, at the Arizona Ecological Service's State Office, 2321 West Royal Palm Road, Suite 103, Phoenix, Arizona, 85021-4951.

FOR FURTHER INFORMATION CONTACT: Bruce K. Palmer, at the above address (602/640-2720).

SUPPLEMENTARY INFORMATION:

Background

On November 20, 1992, the Service published a proposal to list the Arizona willow as endangered with critical habitat (57 FR 54747). At that time the species was known only from high elevation streams and wet meadows in the Mount Baldy vicinity of Apache County, Arizona, located primarily on the Apache-Sitgreaves National Forests and the Fort Apache Indian Reservation (Reservation). Threats identified in the proposed rule included livestock and wildlife impacts, water impoundments and diversions, roads, recreational use, development and maintenance of ski resort facilities, disease, alteration of natural hydrologic regimes, and changes in species composition and structure of the riparian community, including invasion of nonnative vegetation (especially Kentucky bluegrass, *Poa pratensis*) brought about by historic and current livestock use.

In June 1993, following publication of the proposal, the Service was notified of a previously misidentified herbarium specimen of Arizona willow collected in 1913 from the then-named "Sevier Forest" in southern Utah. Preliminary surveys in Utah during the summer of 1993 by the Service did not locate Arizona willow. Surveys initiated by the U.S. Forest Service (FS) resulted in rediscovery of Arizona willow in Utah on June 30, 1994. Subsequent FS surveys documented Arizona willow on the Dixie and Fishlake National Forests, Cedar Breaks National Monument, and adjacent private land. The extent of some individual populations of Arizona willow plants in Utah far exceeds all populations in Arizona.

On September 6, 1994, the Regional Foresters of the Southwestern and Intermountain Regions of the FS and the Regional Director of the Service's Southwest Region made a joint decision to develop a conservation agreement for Arizona willow on Federal lands to ensure the long-term conservation of the species throughout its range. This also required the participation of several non-Federal partners (Arizona Game and Fish Department (AGFD) and Utah Division of Wildlife Resources (UDWR)). A FS policy statement, jointly issued by the Regional Foresters of the Southwestern and Intermountain Regions on December 19, 1994, initiated actions to reduce threats on the National Forests (NF), including designation of FS representation on the Arizona Willow Interagency Technical Team. The Arizona Willow Interagency Technical Team was formed to develop and implement the AWCAS.

Concurrent with the development of a conservation strategy for Arizona willow on Federal lands, the Tribe has developed a management plan that addresses the conservation of Arizona willow on the Reservation. The Tribe's "Arizona Willow Management Plan: An Interim Approach to High-Elevation Riparian and Cienega Ecosystem Management on the Fort Apache Indian Reservation" is consistent with, and complementary to, the strategies and intent set forth in the AWCAS.

Specific protection to Arizona willow from cattle herbivory is provided on NF's and Reservation lands. Arizona willow is protected through rested pastures, livestock exclusion fencing, and/or construction of protective cages. On FS lands, no livestock use of any pasture is allowed without implementation of specific actions to protect Arizona willow. Management plans for each FS allotment that includes Arizona willow habitat will be revised within the guidelines set forth in the AWCAS prior to removal of site-specific protections.

Herbivory by wildlife, especially elk in Arizona, has been identified as a threat to Arizona willow. The AGFD has implemented strategies to reduce elk herd sizes within Arizona willow habitats in Arizona, and have committed to maintain stable or continued reductions of herd sizes pending results of herbivory studies. The Tribe has also initiated actions to stabilize elk herd size. Both the AGFD and the UDWR have provided specific commitments to aggressively manage wildlife populations consistent with monitoring and research information on Arizona willow.

Arizona willow habitat is further conserved through other measures, including the application of FS Standards and Guidelines, and the White Mountain Apache Tribe Codes and Tribal Council Resolutions. These protection actions provide for buffers from timber harvest activities, road closures and off-road vehicle restrictions, relocation of recreational trails; restrictions on dispersed camping, and informational signing.

Detailed monitoring of Arizona willow and a variety of research projects and studies on its population biology and ecology are being undertaken to fully understand the implications of land management actions. Such studies are being implemented through various cooperative efforts by the Apache-Sitgreaves NFs, Dixie NF, Fishlake NF, Rocky Mountain Forest and Range Experiment Station, Cedar Breaks National Monument, White Mountain Apache Tribe, AGFD, UDWR, and the

Service. These studies will help determine appropriate management practices and identify suitable areas for expanding and augmenting depauperate populations.

The designation of special management areas, such as Botanical Areas, Research Natural Areas, and essential habitat, are being evaluated and incorporated into a review process under the National Environmental Policy Act. Special management area designation assures the priority of Arizona willow management and long-term conservation of the species within a multiple-use land management framework.

Continued implementation of the AWCAS for management of Arizona willow on the Apache-Sitgreaves NFs, Dixie NF, Fishlake NF, and Cedar Breaks National Monument, and the implementation of the "Arizona Willow Management Plan: An Interim Approach to High-Elevation Riparian and Cienega Ecosystem Management on the Fort Apache Indian Reservation" are expected to accomplish significant conservation of Arizona willow without its being listed.

The Service has determined that Arizona willow does not warrant listing under the Act and places this plant in category 3C of the plant notice of review. Category 3C species are those species for which information now in the possession of the Service indicates that the species is more abundant or widespread than previously thought and for which substantial threats do not exist. If further research or changes in habitat indicate a significant decline in the species, it may again be included in categories 1 or 2, and its listing status may be reevaluated.

Author

The primary author of this proposed rule is Bruce K. Palmer (see ADDRESSES section).

Authority

The authority for this action is section 4(b)(6)(B)(iii) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Dated: April 25, 1995.

Mollie H. Beattie,

Director, Fish and Wildlife Service.

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